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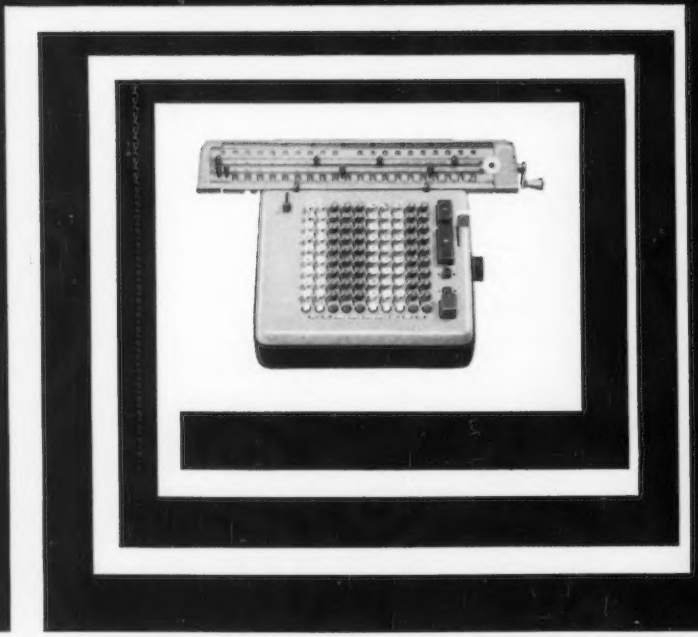

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Correspondence concerning the separate departments should be sent to the Department Editor at the American Statistical Association, 1757 K Street, N.W., Washington 6, D. C.

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The President's Column

Martin R. Gainsbrugh

I have appointed a committee to look into the matter of an increase in dues beginning with the next calendar year. It consists of President-Elect Philip M. Hauser, as chairman, Dorothy M. Gilford, Boyd Harshbarger, Charles D. Stewart and Kenneth B. Williams. The proposal printed here is condensed from a report prepared by the Secretary and submitted recently to the Committee and to the Board and the Council of the Association. The Committee on Dues will make its recommendations at the next meeting of the Board of Directors. Further details will appear in the next issue of The American Statistician.

Proposal for Change in Dues Effective January 1, 1962

I. *Introduction*

It is now apparent that the Association will lose approximately $7,000 in 1961, in spite of a steadily growing membership. Regular members in the United States and Canada comprise about 93 percent of the total membership and now pay regular dues of $8.00 a year.[1] The gap between dues and expenses is closing rapidly. Because of rising costs, each operation and action that is necessary to serve every member is much more expensive. Below is some discussion concerning various items included in the income and expense budgets, comparing past experience and projecting future needs.

For a number of years, the policy of the Board of Directors has been to attempt to accumulate a surplus fund that would approximately equal one year's income. This recognizes that the Association needs funds for expansion of its activities and for special projects, as well as a "cushion" to absorb a loss when, for various reasons, expenses exceed income in a particular year.

The dues for the American Statistical Association have remained among the lowest for a professional society in the United States. Of similar professional societies, most have a dues structure ranging from slightly to considerably more per year for membership. It is rare that two publications are included with the membership, as is the case with our Journal and The American Statistician.

ASA has a particular problem with respect to the structure of its membership that is unusual in professional societies: the widespread diversity of interests of its members. This fact, which has been given considerable attention over the years, means that a certain (and probably substantial) portion of the members consider their connection with ASA as a special professional activity. That is, they look upon themselves primarily as economists, biologists, market research specialists, mathematicians, and so forth. In almost every instance, there is a society devoted to that specific field of interest. Studies from the past several editions of the Membership Directory show that the proportion of members of the ASA who are also members of one or more other professional societies is growing. (The figure from the 1958 Directory is about four-fifths.)

As statistical techniques become more widely used in other areas, this will mean greater growth and responsibilities for ASA. But the Association cannot meet those responsibilities if adequate funds are

(Continued on Page 27)

[1] The policy of setting a very low dues rate for overseas members ($5.00 as compared to $8.00 for U. S. and Canada) was done for obvious reasons.

as we go to press—

TV Ratings Study Completed

On Thursday, March 23, the following release was issued in the House of Representatives:

Rep. Oren Harris (D. Ark), chairman of the House Committee on Interstate and Foreign Commerce and of its Subcommittee on Regulatory Agencies, today issued the following statement:

"I have today filed in the House a report on broadcast ratings made by the American Statistical Association's Technical Committee on Broadcast Ratings. Members of the committee were William G. Madow, Stanford Research Institute, chairman; Herbert H. Hyman, Columbia University; and Raymond J. Jessen, CEIR, Inc. They were assisted by Paul B. Sheatsley, National Opinion Resarch Center, and Charles R. Wright, University of California, Los Angeles.

"The report is entitled 'Evaluation of Statistical Methods Used in Obtaining Broadcast Ratings.' Its preparation was originally authorized by the former Special Subcommittee on Legislative Oversight. By agreement of March 28, 1960, approved March 29, by the House Administration Committee, the Subcommittee engaged the American Statistical Association to evaluate the technical quality of the various ratings ascribed to television and radio programs. The arrangements for the ratings survey are stated in an interchange of letters between me and the president of the Association which are included in the preface to the report."

Mr. Harris said that it was extremely difficult to summarize the report in view of its length and necessarily technical nature.

"There is so much here," he said, "concerning the pros and cons of the use of estimates to arrive at the true ratings of audience size that persons with preconceived attitudes about ratings will probably find something in the report to bolster their attitudes, whether favorable or unfavorable.

"Certain general conclusions in the report deserve emphasis," he added.

"The first conclusion is that, although there are important sources of error in the methods used by each rating service, the services seem to be estimating the ratings fairly well on the average; however, the sheer number of rating estimates that each service issues will lead to a number of occurrences of errors.

"This conclusion has two implications: To the extent that network programming policies are based on the ratings, it is unlikely that technical improvements in methods of estimating the ratings will lead to any support for a change in programming policies. This does not mean that changes in policies should not be undertaken; it only means that rating surveys, however improved, will not yield results on the national level sufficiently different from the present results to indicate that a change in programming policies should be made.

"The second implication is that decisions on whether to advertise on small stations, or perhaps on regional networks, and decisions on local programming might be quite different if improvements in local rating surveys were made. The various criticisms made in the report of the techniques used by the rating services, and the large number of estimates that they produce, both suggest that the estimates for small stations, small areas, and local programs quite often may be considerably in error. This occurs because of the large number of fairly small samples, and the survey compromises made by the rating services as well as because of the large number of estimates.

"The second conclusion is that audience composition data will be more poorly estimated than the ratings themselves. This is a matter of some concern because audience composition data seem to be of increasing importance in the rating industry and the types of compromises that are made by the rating services are related to audience composition.

"This conclusion should receive a more detailed investigation as the importance of audience composition data increases.

"The third point is somewhat technical. In using measures such as 'dollars per thousand households', the broadcast industry is using a measure that, especially when the ratings and the size of sample are small, may be subject to serious statistical difficulties because the rating is in the denominator of the estimate of 'dollars per thousand households'; small errors in the rating may then have a large effect on the estimated 'dollars per thousand households.' The report recommends that, if practicable, the broadcast industry consider adopting a measure such as 'households per hundred dollars' as a substitute.

"Fourth, the report points out that rating services do not provide sufficiently detailed information concerning their data collecting and estimating procedures for the computation of measures of how good these estimates are, taking into account all sources of error. Furthermore, at present, too little research is done on all aspects of the work of the rating services; and what is done is usually not in a form so that it can be published and then subjected to the criticism of those concerned with the quality of the rating information.

"The report, therefore, recommends the establishment of an industry-wide office of methodological research that would either conduct its research itself, or sponsor research on the methods of collecting the data and estimating the ratings and other broadcast measurements, and on the uses made of these data. The establishment of a single industry-wide rating service is not recommended.

"Two final and somewhat unrelated comments are included in the report because there has been some interest expressed in them. The methods used by the rating services will usually yield estimates that are more correct than mail or other surveys in which the respondents essentially select

themselves. Also, well-selected national samples of 1000 or so households provide useful information for many purposes, and cannot be summarily dismissed as being too small.

"Since the quality of a method must be judged relative to the uses to which it is to be put, the Technical Committee would have liked to relate the accuracy of the ratings to the uses made of the ratings. Consequently the Technical Committee prepared a letter addressed to various users of such services, soliciting information on the way the findings are used and the types of decisions affected. The information received in response to this request did not permit the determination of any specific techniques of using the ratings.

"The letter also requested any methodological studies concerning the ratings that had been conducted by a user of those services, in the hope that such direct and substantial evidence for our evaluation would be found. Very little such information was obtained. The Technical Committee's report suggests that many users of ratings, as many users of surveys in general, would prefer to be given data which they can treat as they wish without concerning themselves with such questions as errors of response or whether the population surveyed is the population concerning which they wish information or whether the sample has been well designed and selected or is large enough, and so on."

Chairman Harris said the report also makes a number of highly technical observations and in pages 19-29 sets out nine specific conclusions and recommendations on each.

"While I have no proficiency in this specialized field, several of these recommendations seem to me to be highly significant.

"Recommendation one is one that the rating services should publish in their reports or have available for distribution to clients or others, sufficiently detailed descriptions of what they do, and of the quality of the ratings they provide.

"Recommendation two is that the rating service should provide adequate information in their pocket pieces and reports on the accuracy with which their estimates approximate the values estimated."

Chairman Harris further stated: "The report is a technical explanation of the methods used by various rating services. It does not attempt to recommend any policy with respect to the content of programs or how far ratings ought to be relied upon in determining program format.

"The Technical Committee on Broadcast Ratings was not an investigatory group. It was not supposed to and did not investigate complaints concerning individual rating services or surveys. It was concerned primarily with the methods used by the services in estimating the ratings. It should be understood that although individual rating services are discussed, this has been done only as an auxiliary to the over-all evaluation of their techniques. The report makes no attempt to compare the quality of work done by the rating services.

"In its work the Technical Committee was given a very high level of co-operation by the rating services. For this I express the thanks of our Committee."

The Chairman concluded by saying: "On behalf of our Committee I wish to express deep appreciation for the manner in which the American Statistical Association responded to our request that they undertake the arduous task of evaluating the accuracy of methods employed by the rating services. This report reflects the careful, informed, independent, and expert views of three of the country's outstanding statistical analysts. Dr. Madow, Professor Hyman, and Dr. Jessen, at considerable sacrifice of attention to their other manifold and pressing duties, have given unstintingly of their time and energy to its preparation. In my opinion it is a useful contribution toward solving the tremendously complex and difficult problem of how the airwaves can best be used in the public interest—avoiding censorship or excessive governmental control on the one hand, and excessive commercialism on the other. To these three gentlemen I extend the sincere thanks of the Committee."

The report states that "The American Statistical Association was to take the responsibility for appointment of an able committee, and to provide it with administrative assistance. Once the technical committee was appointed, it was agreed that neither the American Statistical Association nor the Subcommittee on Legislative Oversight was to have any responsibility for approving or censoring the report, which was to be the sole responsibility of the members of the technical committee."

Copies of the report will be available at the American Statistical Association, 1757 K Street, N.W., Washington 6, D.C. at 75¢ each (no stamps please) which includes cost of handling and mailing. A small supply may also be available at the Government Printing Office, House Report number 193.

January Board and Council Meeting

The Board of Directors and Council of the American Statistical Association met in New York City on January 23, 1961. Those present included President Martin R. Gainsbrugh, Past President Morris H. Hansen, Vice-Presidents George E. P. Box and Geoffrey H. Moore, Secretary-Treasurer Donald C. Riley, most of the members of the Board and Council, and several guests.

Mr. Riley presented requests for charters from proposed chapters in Atlanta, Georgia, and Madison, Wisconsin, which were approved.

The report of the Board of Directors for 1960 was read and accepted. It will be published in full in the June issue of the ASA *Journal*, as will the report of the Secretary-Treasurer. In his report Mr. Riley said that while the 1960 Annual Meeting at Stanford had been an excellent and well organized meeting, although not as well attended by members from the West Coast as might have been expected, the total expenses including travel had not been covered by income. He noted that an increase in the registration fee from $3.00 to $5.00 would help offset any financial loss from future meetings. The ASA fee is much lower than that of comparable organizations.

The 1961 preliminary budget was discussed. Unless an increase of dues is put into effect, the Association is faced with a deficit in 1961, as well as in 1960. The anticipated increase in membership and subscriptions is not sufficient to compensate for increased expenses. Mr. Riley pointed out that, unlike most other professional societies, the American Statistical Association has not raised dues since 1948. The Association's

present program has been built up slowly over the years since the retrenchment after the deficits in the late 40's. There has been no increase in staff, but costs have risen. The *Journal* shows a considerable increase with smaller increases for most of the other items. The Secretary-Treasurer's Report was accepted and the 1961 proposed budget was approved. The proposal for an increase in dues is to be referred to a special committee appointed by the president, with the understanding that the committee's recommendation will be presented at the May 5 Board Meeting.

George Hitchings, Chairman of the 1961 Program Committee, reported progress in preparing for the December Annual Meeting. The Section quotas for sessions will remain the same as last year. The Chairman of the Local Arrangements Committee, Robert E. Johnson, also reported briefly.

Mr. Johnson presented a statement on the proposal for a refresher course in business statistics which the Business and Economics Statistics Section has voted to sponsor. The object of the course would be to review basic statistical techniques and update conferees on new statistical methods and approaches, particularly of the post-war period. Several universities have expressed interest in presenting this course in cooperation with the Association. The cost for such a course is estimated at approximately $300 per person, including room and board.

Mr. Hansen was presented with a framed certificate which reads as follows: "Morris H. Hansen, 56th President of the American Statistical Association, in its 121st year. For outstanding energy and initiative in recognizing new areas for development, in taking positive steps to encourage action within these specialized fields in the Association and in furthering the closer cooperation of scholarly societies interested in the use and improvement of statistics." In thanking the Board and Council Mr. Hansen expressed his appreciation for the help he received during his term as President.

John I. Griffin, representing the 3rd District on the Council, described the New York Chapter's award program offered to 19 selected colleges in the New York area. This program will be described in detail in the next issue of THE AMERICAN STATISTICIAN.

Morris Hamburg, a member of the Committee on Publications Policy, presented the recommendations of that Committee in the form of motions, which were adopted with one minor change. The report as approved will be published in THE AMERICAN STATISTICIAN. The Board and Council expressed their appreciation for the fine work done by the Committee.

There was a discussion of what the position of the American Statistical Association should be with respect to a council or conference board of societies interested in statistics. This is a possibility growing out of the meeting held last September at Onchiota, New York. The consensus was that the Association should move slowly on this matter, but should continue to explore with the other societies closer collaboration and cooperation.

Howard L. Jones presented the report of the Committee on Chapter and Regional Activities. The report indicated there was need for a permanent committee to encourage and assist in the formation of new chapters, to offer help to existing chapters in solving common problems, and to recommend to the Council, such changes in the structure of the Association as might be helpful to both the chapters and the parent Association. The Board and Council approved the report and suggested that Mr. Jones be asked to continue as chairman of a permanent committee.

Mr. Gainsbrugh reported appointments to the Committee on Nominations and the Committee on Committees. The full list of Section officers and Committee appointments for 1961 appears elsewhere in this issue.

The next meeting of the Board of Directors will be held at the Cosmos Club in Washington, D. C., on May 5, 1961.

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1961 ASA Meeting

Plans for the 1961 Annual Meeting of the American Statistical Association to be held at the Roosevelt Hotel in New York City, December 27-30, are well under way. The 1961 *Local Arrangements Committee* members, with their assignments, are as follows:

Co-Chairmen—ROBERT E. JOHNSON, *Western Electric Company, Inc.* and SIDNEY SAMETH, *Union Health Center*

Coordinator—VIRGINIA HOLRAN, *Institute of Life Insurance*

Secretary—REGINA LOWENSTEIN, *Columbia University*

Treasurer—SYDNEY A. TRUNDLE, JR., *Manufacturers Trust Company*

Employment Register—JOHN FIRESTONE, *City College of New York*

Exhibits—ROBERT L. TEBEAU, *Merrill Lynch, Pierce, Fenner & Smith*

Fee Events—MARGARET K. MATULIS, *McGraw-Hill Publishing Co.*

Information — HERBERT BIENSTOCK, *Bureau of Labor Statistics*

Joint Printed Program, Representative on—MILDRED M. LAUDER, *N.Y. State Division of Employment*

Publicity—JOSEPH NAAR, *National Industrial Conference Board*

Registration—ALBERT I. HERMALIN and WILLIAM KINGSLEY, *Institute of Life Insurance*

Room Arrangements—JOHN I. GRIFFIN, *City College of New York*

Roster—L. A. HARTHEIMER, *IBM*

The *Program Committee* has already scheduled a number of interesting sessions. However, it is not yet too late for members to propose additional subjects. Ideas should be sent promptly to the Chairman, George P. Hitchings, or to one of the following Section Representatives of the Committee: Arthur M. Dutton—Biometrics Section, Albert Sommers—Business and Economic Statistics Section, Ray B. Murphy—Section on Physical and Engineering Sciences, Eli S. Marks—Social Statistics Section, and Samuel B. Richmond—Section on Training. An announcement soliciting contributed papers appears elsewhere in this issue.

Travel Grants To Mathematical Congress

Travel grants will be made to a number of mathematicians who wish to attend the International Congress of Mathematicians in Stockholm, on August 15-22, 1962. It is hoped that funds available through various sources may provide travel assistance for a considerable number of mathematicians. There will be a greater effort than in the past to give aid to younger people.

Awarding of grants will be made only to those persons whose applications have been received, in good order, by November 1, 1961. The selection will be made by a committee consisting of the regular Committee on Travel Grants of the Division of Mathematics of the National Academy of Sciences-National Research Council enlarged to include representatives of societies affiliated with the Division and representatives of various governmental agencies.

Application forms for travel grants may be obtained from the Division of Mathematics, National Academy of Sciences, National Research Council, Washington 25, D. C.

Fellowships for Mathematics Graduates

The Division of Preventive Medicine and the Institute of Industrial Health of the College of Medicine of the University of Cincinnati, with the support of the Public Health Service, are instituting a training program in Epidemiology and Biostatistics. As part of this program training and experience will be given in Biology and research to prospective candidates for a Ph.D. degree in Mathematics or Statistics. The prospective fellow should have his B.A. or B.S. in Mathematics. He should have decided on a department at which he will want to complete his graduate work. Above all he must have demonstrated a level of achievement that will make him an acceptable candidate for an advanced degree at any university. His program here will consist of two parts extending over a period of two years: First, he will continue to work for an advanced degree. His particular program will be designed in consultation with the Mathematics department of his choice and will emphasize areas of content suggested as pre-requisites. At the same time he will prepare himself to take the examination required of candidates for the Masters degree in Mathematics at this University.

Second, the student will receive training in Biology. He will be prepared, by tutorial arrangements during the

first summer of his residency, for courses in the sophomore year in the Medical School.

The student will work with medical and other fellows on research projects and will be expected to write a publishable paper in some aspects of Mathematical Biology at the end of his two-year stay.

The stipend will depend on qualifications and marital status and will range from $3400 to $4400 plus tuition. For further information write to Dr. Theodor D. Sterling, Department of Preventive Medicine, College of Medicine, University of Cincinnati, Cincinnati, Ohio.

Roswell Park Traineeships

The Department of Statistics at Roswell Park Memorial Institute has been awarded a grant by the National Cancer Institute, and in conjunction with the University of Buffalo offers a two-year graduate on-the-job training program leading to a Master of Science degree in biostatistics with two year appointments.

Students with a Bachelor's degree, and possessing a good background in mathematics (through calculus), and course work in physical, biological or behavioral sciences who will begin their graduate work next fall are sought as applicants for these appointments. In addition to taking graduate course work, trainees will receive on-the-job training in research studies that are currently in progress at Roswell Park Memorial Institute. Trainees will receive an average annual stipend of $2,300 plus tuition.

Requests for further information and application forms should be addressed to Miss Barbara A. Cote, c/o Dr. Irwin Bross, Chief, Department of Statistics, Roswell Park Memorial Institute, 666 Elm Street, Buffalo 3, New York.

Biometry Traineeships

Twenty-five colleges and universities throughout the country are now offering graduate training programs in biometry with the support of training grant funds from the National Institutes of Health, Public Health Service. These programs are designed to prepare students in the application of statistical and mathematical methods to biological problems, particularly those relating to health and medical science. Employment opportunities for biometricians are excellent, with the demand by governmental and voluntary health agencies, medical research and educational institutions, and industry running far in excess of the available supply of trained personnel.

Programs of study are individually designed to lead to doctoral degrees, and in special cases to other academic degrees. Some postdoctoral fellowships are also available. Traineeship stipends are provided at various levels depending on the previous education and experience of the trainee, and include allowances for dependents.

Further information about the programs, together with a list of the program directors at participating colleges and universities, may be obtained by writing to the Advisory Committee on Epidemiology and Biometry, Division of General Medical Sciences, National Institutes of Health, Bethesda, Md.

Public Health Traineeships

The Public Health Service has announced the availability of traineeships for graduate training of professional public health personnel during the 1961-1962 academic year.

Traineeships in public health statistics are available to qualified persons. They provide stipends from a minimum of $250 per month for a post-bachelor candidate to a maximum of $400 per month for a post-doctoral candidate and additional allowances for dependents, travel of the trainee, and academic tuition and fees.

Additional information and application forms may be secured from the Division of General Health Services, Public Health Service, U.S. Department of Health, Education, and Welfare, Washington 25, D.C.

Johns Hopkins Biostatistics Program Expanded

Beginning next September, the Department of Biostatistics at The Johns Hopkins University will offer an expanded program of study and research leading to Master of Science and Doctor of Science degrees. The curriculum has been modified by increasing the scope of the basic courses in statistical theory and statistical methods and by the addition of specialized courses including least squares and regression, stochastic processes, nonparametric methods, sampling and survey methods, biological assay, design of experiments and digital computer programming. These changes reflect a realization of the need for more intensively trained statisticians in the areas of biology, medicine and public health, and they are the direct result of the increasingly important role played by mathematics and statistics in all areas of scientific research.

The new program was made possible in part by the recent addition to the department of Drs. Allyn W. Kimball and David B. Duncan who together with Drs. Helen Abbey, Earl Diamond, John J. Gart and Margaret P. Martin form the permanent staff. In September, 1961, Dr. Norman T. J. Bailey of Oxford University will join the staff as visiting professor and will teach the course in stochastic processes. Additional appointments may be announced shortly.

The department has a limited number of liberal fellowships available, and interested students are invited to write to the Chairman, Department of Biostatistics, 615 North Wolfe Street, Baltimore 5, Md. for further information.

ORSA Meeting

The Ninth Annual (Nineteenth National) meeting of the Operations Research Society of America will be held at the Sheraton-Blackstone Hotel in Chicago, May 25-26, 1961. The meeting committee consists of Donald H. Schiller, Chairman, Marvin Lavin, Allan Butterworth, George Nicholson and Joseph A. Reres. Joint sessions are being planned with the Institute of Mathematical Statistics, which will be meeting in Chicago during an overlapping period.

Summer Courses at Purdue

Three intensive courses in the fields of statistical methods and quality control, design of experiments, and operations research are being offered at Purdue University this summer. All three courses are sponsored jointly by the Statistical Labo-

ratory and the Division of Adult Education of the university.

The course in Statistical Methods and Advanced Quality Control will be given September 5-15, 1961, under the direction of Professor Irving W. Burr. It is designed for those who have had the equivalent of one of the intensive courses in statistical quality control given during and after the war, and who want to learn more about the statistical approach to industrial and research problems.

The second course, Design of Experiments, is for statisticians, quality control personnel, engineers and others concerned with planning, analyzing and interpreting the results of industrial experiments. Previous statistical training is required. The course is under the direction of Professor Charles R. Hicks, and will be given June 7-17.

The third course is on Mathematical Techniques of Operations Research, and is also designed for statisticians, quality control analysts, engineers and other technical personnel. It will be given June 5-15 under the direction of Professor Paul Randolph.

Further information may be obtained by writing to the Division of Adult Education, Purdue University, Lafayette, Indiana.

Industrial Engineering Seminars

The annual industrial engineering seminars sponsored by the Department of Industrial and Engineering Administration, Sibley School of Mechanical Engineering, Cornell University, will be held again this year at Cornell, June 13 through June 16. Participants will attend general sessions and will enroll in one of the following nine groups: (1) Industrial Management, (2) Engineering Administration, (3) Capital Investment Planning, (4) Operations Management of the Smaller Company, (5) Work Measurement, (6) Systems Simulation Using Digital Computers, (7) Queuing and Inventory Theory, (8) Statistical Decision-Making, (9) Statistical Reliability Analysis. Speakers and discussion leaders will include specialists from both industry and Cornell University.

Additional information may be obtained from J. W. Gavett, Seminars Coordinator, Department of Industrial and Engineering Administration, Upson Hall, Cornell University, Ithaca, N. Y.

Minnesota Summer Session On Health Statistics

The Fourth Graduate Summer Program of Statistics in the Health Sciences will be held at the University of Minnesota from June 13 to July 28, 1961. Persons interested in course work in elementary or advanced statistics, vital records, records management, design of experiments, bioassay, sampling, demographic methods in public health, and statistical aspects of genetics, nutrition research and pharmacology are invited to attend. The faculty will include experts from around the country.

Housing, food and course fees will be about $300. Stipends are available to qualified students. For further information write to: Biostatistics, 1226 Mayo Memorial, University of Minnesota, Minneapolis 14, Minn.

Summer Programs at Michigan

The Survey Research Center of The University of Michigan will hold a summer institute in Survey Research Techniques for the 14th consecutive year. This special program is designed to illustrate the theory and application of survey research to such fields as business and human relations, psychology and sociology, political behavior, public communication and influence, public health, economics, statistics, etc. Again this year a special workshop will be offered in the practical application of survey research methods to these individual fields.

The 1961 dates for the regular session are July 24 to August 19, with introductory courses offered from June 26 to July 22. For further information write to the Survey Research Center, The University of Michigan, Ann Arbor, Michigan.

The College of Engineering of The University of Michigan is offering a summer program of intensive, noncredit courses in rapidly developing fields of technology for practicing engineers and scientists. Among the courses which may be of interest to statisticians are "Foundations and Tools for Operations Research and the Management Sciences," and "Quality Control by Statistical Methods." Other courses dealing with operations research, computing machine design and programming and advanced data processing techniques will be offered.

Requests for further information should be addressed to Joseph J. Taylor, Engineering Summer Conferences, College of Engineering, University of Michigan, Ann Arbor, Michigan.

Quality Control Courses

The 18th annual Statistical Quality Control Intensive Courses for the Chemical and Processing Industries will be held at Rochester Institute of Technology this summer from June 12 through June 29.

Industrial Statistics and Quality Control, the fee for which is $225, will run from June 12 through June 21. The final two days will be devoted to the special Applications Seminar, which will be included in the total course cost. Those attending the Design of Experiments seminar from June 22 through June 29, the fee for which is $175.00, may also attend the special Applications Seminar for an additional fee of $50, if they so desire. The seminar will be conducted by four industrial experts.

Course content for Industrial Statistics and Quality Control will include: frequency distributions, sampling, Shewhart control charts, acceptance control charts, test of significance, confidence intervals, analysis and components of variance, correlation and regression, and determination of sample size.

The Applications Seminar will highlight: basic plant uses of statistics, use of specialized statistical tools, problems in analysis of variance, and studies related to components of variance.

Course content for the Design of Experiments program includes: sample size determination, review of analysis of variance, sampling and nested designs, completely randomized and randomized block design, incomplete block designs, factorial experiments, orthogonality, confounding, fractional factorials, multiple regression, response surfaces, and evolutionary operation.

For additional information on these courses, or to register, write to: Harold M. Kentner, director, Extended Services Division, Rochester Institute of Technology, Rochester 8, N. Y.

Job Openings

The Ordnance Ammunition Command, a procurement agency of the Ordnance Corps, Dept. of the Army, needs statisticians for positions of responsibility in a reliability and quality evaluation organization. Successful applicants will be involved in the estimation of quality levels, the prediction of reliability of ammunition, including sophisticated types of weapons, and the development and application of new and more complex quality assurance techniques. A high-speed computer is extensively employed for data processing and for the solution of complex problems. Starting salaries range from $5355 to $8955 per annum.

Interested persons should write to:
Commanding Officer
Ordnance Ammunition Command
ATTN: ORDLY-AIE, R. A. Banzhaf
Joliet, Illinois

PERSONAL NEWS

OM P. AGGARWAL who has been on leave of absence from Purdue University, working as Agricultural Statistician in the Technical Assistance Program of the Food and Agriculture Organization of the United Nations in Santiago, Chile, has been transferred to Lima, Peru. He is working as a Statistical Adviser to the Peruvian Government in sampling problems connected with the agricultural census to be taken in Peru in July 1961. He continues to be on leave from Purdue University.

BEATRICE AITCHISON, Director of Transportation Research and Statistics, Bureau of Transportation, Post Office Department, has received one of the new Federal Woman's Awards made to six outstanding women in the Federal career service. Miss Aitchison received her award for "outstanding leadership in research and training in the field of modern transportation economics and traffic management."

MAX ASTRACHAN, Logistics Department, The RAND Corporation, has received a part-time appointment to the faculty of the School of Business Administration, University of California, Los Angeles, as Lecturer (Professor). He will teach a course in statistics.

WILLIAM R. BUCKLAND has resigned

(*Continued on Back Cover*)

INTERNATIONAL STATISTICAL ACTIVITIES

Germany

The 32nd Annual Conference of the GERMAN STATISTICAL SOCIETY will be held in Saarbrucken at the end of October 1961. It is again intended to combine this with the Conference of the Association of German Municipal Statisticians as has been the practice in the past. The principal subject intended for the agenda is the "Reconciliation of National Economical and Industrial Management Aspects in Economic Statistics". The main speaker will be Professor Dr. Bruno Gleitze. Lectures are also intended on the subject: "Initial and Progressive Training of Statisticians", meaning the training at Universities and, apart from this, the organized progressive training of practicing statisticians, which, so far, hardly exists in Germany.

Simultaneously there will convene Subcommittee I on "Market Study and Market Analysis", the study group "Regional Statistics", the committees "Application of Statistical Methods in Industry" and "Committee for New Statistical Methods", and subcommittee II on "Autogenous Statistics".—*Dr. W. Maier, German Statistical Society*

Italy

The ITALIAN STATISTICAL SOCIETY published in 1960 the *Atti della XIX Riunione Scientifica*, the proceedings of the meeting held in June 1959. The volume comprises 200 pages.

The *Atti* includes the opening address by Professor Giuseppe Ottaviani entitled "Su alcuni problemi riguardanti la transvariazione", a group of papers presented at a joint session with the Italian Committee for Research on Income and Wealth, other papers on a variety of statistical topics, and the closing address by Professor Antonio Giannone entitled "Iredditi da lavoro e da capitale in Italia e in altri Paesi", together with discussion and the proceedings of business meetings.

Papers presented at the joint session with the Italian Committee for Research on Income and Wealth included:

"Sviluppi attuali dei metodi di valutazione e degli schemi ricchezza", Dr. Armando Agostinelli.

"La produttività integrale e le possibilità della sua misurazione", Prof. Fernando Pedroni.

The other papers included:

"Ipernormalità dell'indice di rifrazione dell'occhio", Prof Corrado Gini and Dr. Anita Trezza.

"Su alcune caratteristiche antropologiche dei Dauada del Fezzan", Dr. Maria Teresa Patriarca.

"Appunti demografici sulla popolazione di el-Gedid", Dr. Laura Andreozzi.

—*Prof. Fernando Pedroni, Italian Statistical Society.*

Netherlands

The annual meeting of the STATISTICAL SOCIETY OF THE NETHERLANDS, "Statistics Day 1961", was held March 21, 1961 at Scheveningen. The theme of the meeting was "Van geval tot getal" (From cases to numbers), and this was the title of an address by Ir. J. van Ettinger (Rotterdam).

A featured speaker was Prof. M. G. Kendall (London), whose address was titled "Statistics: Past, Present and Future". The program for the afternoon included sessions organized by each of the various sections of the society.—*Statistical Society of The Netherlands*

Economic Institute, Rotterdam

The activities of the Econometric Institute of the Netherlands High School of Economics at Rotterdam have recently been expanded in two directions. In the area of business econometrics is the INTERNATIONAL CENTER FOR MANAGEMENT SCIENCE which is affiliated with the Institute. This Center operates under the auspices of The Institute of Management Sciences.

The RESEARCH CENTER OF CIRET (International Contact on Business Tendency Surveys), which is also affiliated with the Econometric Institute, is concerned with investigations in the field of economic surveys.

A biweekly Colloquium is held at the Econometric Institute during the academic year, for the presentation of research papers, usually in English.—*Statistisch Nieuws, Rotterdam*

Philippines

The PHILIPPINE STATISTICAL ASSOCIATION, organized and incorporated in 1952, held its Eighth Annual Conference on July 6, 1960. The following papers were read and discussed:

Postwar Foreign Investments in the Philippines, by Gabriel Itchon, Statistician, Department of Economic Research, Central Bank of the Philippines

Some Notes on Income Distribution in the Philippines, by Clarence L. Barber, U. N. Senior Adviser on National Income Statistics, The Statistical Center, University of the Philippines

Statistics in Professional Management, by Cesar M. Lorenzo, Executive Vice-President and General Manager, Philippine Phoenix Surety and Insurance, Inc.

Urban Differentiation in the Fertility of Married Women in the Philippines, 1956, by Kathleen Jupp, U. N. Adviser in Population and Related Statistics, The Statistical Center, University of the Philippines

Control and Evaluation Techniques in the 1960 Census, by Bernardino A. Perez, Chief Statistical Coordinator, Office of Statistical Coordination and Standards, National Economic Council, Manila

An Appraisal of the Philippine 1960 Census Planning and Enumeration Work, by Perfecto R. Franche, Chief, Division of Surveys, Bureau of the Census and Statistics

A Sample Survey of Voters' Preferences in the Philippines, by Enrique T. Virata, Executive Vice-President, University of the Philippines

The Association held a three-day seminar on statistical quality control from August 25 to 27, 1960, in which ten papers were read. After the reading of each paper, there was an open forum.—*Dr. Tito Clemente, University of the Philippines*

Poland

A Scientific Conference on Operations Research Problems was held at Warsaw, November 18, 1959, sponsored by the Department of Mathematical Statistics of the Central School for Planning and Statistics (SGPiS).

Thirteen papers were read, chiefly on various topics related to linear programming theory and applications. —*Przeglad Statystyczny, Warsaw.*

Spain

The First Annual Meeting of Spanish Mathematicians was held October 3-6, 1960, in Madrid. The meeting had three purposes: presentation of mathematical research papers, consideration of the organization of research and the teaching of mathematics in Spain, and the reorganization of the Spanish Royal Society of Mathematics. The technical sessions were held in four sections: Analysis and Statistics; Geometry and Topology; Numerical, Graphical and Automatic Calculation; Algebra, Logic and Foundations of Mathematics.—*Revista Matematica Hispano-Americana, Madrid*

Switzerland

The annual meeting of the Swiss Society for Statistics and Economics was held May 27-28, 1960, in Lucerne. Papers presented at plenary sessions included:

"Die langfristigen Auswirkungen der europäischen integration auf die schweizerische Volkswirtschaft," Dr. Alfred Bosshardt (Herrliberg).

"Die wirtschaftliche integration Europas aus der Perspektive der Europäischen Freihandels-Assoziation," Dr. Peter Aebi (Zürich).

"Intégration économique européenne et communauté des Six", Prof. Maurice Byé (Paris).

These papers, together with discussion, were published in the September 1960 issue of the Society's journal.—*Schweizerische Zeitschrift für Volkswirtschaft und Statistik*

Yugoslavia

The Sixth Conference of the Yugoslav Statistical Society was held at Beograd, September 15-18, 1960. There were four technical sessions. At the first, on the system of economic statistics in Yugoslavia, fifteen papers were presented. Four papers were read at a session on the application of electronic computers in statistics, and seven papers were read at a session on mathematical statistics. There was a panel discussion at a session on statistical education.—— *Statisticka Revija, Beograd*

Inter American Statistical Institute

A second edition of the *Bibliography of Statistical Textbooks and Other Teaching Material* was published in 1960 by the Inter American Statistical Institute. Copies may be obtained at 75 cents each from the IASI (address: Pan American Union, Washington 6, D.C.).

The bibliography is organized in three sections listing materials which are principally in English, Spanish, and Portuguese, respectively. The section devoted to textbooks and other teaching materials principally in English is further divided into chapters according to fields of applications of statistical techniques. The bibliography comprises 120 pages and was prepared with the assistance of about 50 collaborators. —— *Inter American Statistical Institute*

African Meeting of IARIW

I attended the African meeting of the International Association for Research in Income and Wealth, which was held in the Imperial Theatre at Addis Ababa, Ethiopia, from January 4-10, 1961, as representative of the American Statistical Association. This meeting was the third in a series of regional meetings organized by the International Association with the help of a grant from the Rockefeller Foundation, previous meetings having been held in June 1959 in Rio de Janeiro for Latin America and in August 1960 in Hong Kong for countries in Southeast and South Asia. The main purpose of these regional meetings is to enable members of the IARIW and other economists working in the field of national accounting, who reside in the area but are unable to attend the bi-annual regular meetings of the association customarily held in Europe, to get together for a discussion of problems of common interest, and to meet with a few leading European and North American specialists in the field of national accounting.

The African meeting was attended by about three dozen economists. While only about one dozen of the participants were natives of African countries, most of them had considerable first-hand experience with national accounting in Africa, acquired either as resident members of government statistical organizations, or on the basis of research projects in Africa.

The meeting was organized around about twenty papers dealing with three main subjects: a critical evaluation of existing estimates, special problems of national income estimation in Africa, and the use of national accounts for development planning. Most of the papers were circulated in advance of the meeting and were of high quality. The discussion for most of the papers was lively and in some cases quite protracted. From the point of view of the probable effect on national accounting work in the region, the Addis Ababa meeting may turn out to be the most successful of the three regional meetings which the Association has organized.

The main immediate result of the conference was the decision to circulate one of the basic papers (G. Billington, "A minimum system of national accounts for African countries") among the statistical offices of all African countries; and to make an attempt on the basis of their sugges-

tions to work out a system of national accounts specifically adapted to African conditions, a system which would then be submitted by the Economic Commission for Africa to the statistical office of the United Nations. The adoption of such a uniform system of national accounts, specifically adapted to African conditions although tied in with the standard United Nations system, would consitute a considerable step forward in the practical use of national accounts in Africa.

The IARIW meeting was followed by a three day conference organized by the Economic Commission for Africa (which had participated in the preparation of the IARIW meeting) attended primarily by the operating statisticians among the participants and devoted primarily to a more detailed discussion of some of the technical problems.——*Dr. Raymond W. Goldsmith, Washington, D. C.*

African Demography

The INTERNATIONAL UNION FOR THE SCIENTIFIC STUDY OF POPULATION has published a volume entitled *Problems in African Demography*, the report of a Colloquium held at Paris, August 20-27, 1959. The Colloquium, sponsored by the Union, was a meeting of individuals interested in African demographic statistics to exchange experience and to consider objectives and methods in the development of demographic information in tropical Africa.

The report was prepared through collaboration of the Chairman of the Colloquium, Frank Lorimer, and the Rapporteur, Dudley Kirk. The full text is given both in English and in French, about 30 pages each. The report may be obtained for $1.00 (or 5,00 N.F.F.) from: *Union internationale pour l'étude scientifique de la population, 29, quai Branly, Paris 7 ème, France.*

UN Population Commission

The 11th Session of the POPULATION COMMISSION of the UNITED NATIONS was held at United Nations headquarters, February 7 through 17, 1961. Jacques Mertens de Wilmars of Belgium was re-elected Chairman, Hassan Hussein of the United Arab Republic was elected as Vice Chairman, and Conrad Taeuber of the U.S. was named Rapporteur. The agenda included a review of the objectives and accomplishments of the United Nations in the field of population, and of the world demographic situation with primary reference to mortality, demographic studies relative to policy making and the planning of economic and social development programs for underdeveloped countries, and technical assistance in the demographic field.

The Commission recommended that a second world population conference be held in 1964 or 1965 when the results of the new censuses will be available. A major element in the work program for the next years will be technical assistance to aid underdeveloped countries in the evaluation, analysis, and utilization of the results of censuses of population. Two seminars on this subject have been held; one in Latin America and one in Asia. Additional seminars and workshops will be developed and technical assistance will be given to countries which request such assistance in order to make their census results of the greatest possible value in their programs for economic and social development.

The Commission also emphasized the need for improvement of mortality statistics in many parts of the world and recommended that the appropriate international agencies take steps leading to improvement in this field.

The United Nations has recently completed a set of population projections for all parts of the world. It is proposed to proceed to develop projections of the economically active population, the school age population, households and families, and rural and urban population. Manuals describing the methods for the preparation of such projects are to be prepared and consideration is being given to the development of a set of international standards for population projections.

The United States Delegation consisted of Conrad Taeuber, Bureau of the Census; Ansley J. Coale, Princeton University; Howard G. Brunsman, Bureau of the Census; and John Patterson, Department of State.——*Conrad Taeuber, Bureau of Census.*

TIMS Brussels Meeting

The 8th Annual International Meeting of THE INSTITUTE OF MANAGEMENT SCIENCES will be held in the Palais des Congrès at Brussels, Belgium, on August 23-26, 1961 (one week before the opening of the Paris meeting of the International Statistical Institute). The following topics will be included in the TIMS program:

1. Programming under Uncertainty
2. Simulation and Gaming
3. Rational Investment Decisions
4. Organization Theory and Analysis
5. Subjective and Objective Probability
6. Reality and Theory in Management Science
7. Adaptive Systems
8. Behavioural Sciences

Arrangements will be made for meetings of the colleges and special sessions are also being planned, including one which will be devoted to reports on research from the newly founded International Center for Management Science at Rotterdam, The Netherlands. The Program Chairman is Professor William W. Cooper, Carnegie Institute of Technology.

The registration fee is $12 for TIMS members and $15 for others. Registration for North Americans is handled by Harold H. Cauvet, Executive Director of TIMS (address: 250 North Street, White Plains, New York, U.S.A.). The registration will be closed on April 1, 1961. Prospective participants who fail to apply before that date are advised to write to Dr. Jacques Drèze, Chairman of the Local Arrangements Committee (address: Department of Economics, University of Louvain, Louvain, Belgium); but no guarantee can be given that registration will then be possible in view of space limitations.——*The Institute of Management Sciences*

FEDERAL STATISTICAL ACTIVITIES

1961 Joint Economic Committee Studies

The Joint Economic Committee of the U.S. Congress, under the chairmanship of Wright Patman of Texas, has announced its organization and plans for 1961. Studies contemplated by the full Committee include: Study of the Dealer Market for Federal Government Securities, Review of the Annual Report of the Federal Reserve System, Variability of Private Investment in Plant and Equipment, Inventory Movement, Accumulation and Liquidation.

The Subcommittee on Economic Statistics now includes Senators William Proxmire, Chairman, Paul H. Douglas, and J. W. Fulbright and Representatives Richard Bolling, Thomas B. Curtis and William B. Widnall. Studies planned by the Subcommittee for 1961 include: Government Price Statistics, Study of Unemployment, Productivity, Prices and Incomes, The Federal Budget as an Economic Document.

Recent hearings were held on the Economic Report and on the economic situation and outlook. Hearings on Government Price Statistics are to be held in May or June.

The staff of the Joint Economic Committee is headed by Wm. Summers Johnson, Executive Director and John W. Lehman, Deputy Executive Director and Clerk.——*James W. Knowles, Staff Economist for the Subcommittee on Economic Statistics*

Subcommittee on Census and Government Statistics

The Subcommittee on Census and Government Statistics of the Post Office and Civil Service Committee of the House of Representatives is concerned with census and other statistical programs. At present, among other activities, they are assembling information on HR 1100 introduced by ex-Congressman Udall (now Secretary of the Interior) which would authorize a mid-decade "census of population, unemployment, and housing" in 1965. The subcommittee also has under study the census of transportation which has been authorized (13 USC 131) but not taken.

Congressman John Lesinski of Michigan is Chairman of the Subcommittee. Other members include David Henderson, North Carolina; Arnold Olsen, Montana; Richard Ichord, Missouri; August Johansen, Michigan; Glenn Cunningham, Nebraska; and Edward Derwinski, Illinois. Ex officio members include Tom Murray, Tennessee, Chairman of the Post Office and Civil Service Committee, and Robert Corbett, Pennsylvania, ranking minority member. The Committee staff is headed by Charles Johnson, executive director.——*Tom Corcoran, Staff member, Subcommittee on Census and Government Statistics*

New Civil Service Standards For Statistical Positions

The new occupational standards for statistical positions published by the Civil Service Commission in March offer a composite picture of the profession as it exists in the government service at this time. Those concerned with the development of statistics will find significance in the kind and degree of change introduced in relation to the earlier standards published in June, 1948.

Standards for Federal Service occupations are designed and prepared as calibrating tools to assist in consistent and equitable administration of major portions of the Government's personnel program. The Civil Service Commission project which produced the original standards in 1948 involved nearly two years of intensive effort. Most of the leading statisticians then in Federal Service contributed to the delineation and definition of statistician. The resulting essay on the nature and limits of Statistics as a profession which comprised the introduction to the 1948 standards was a reasonable description of the profession as then represented in the Federal Service.

In a profession linked so directly to technological advances, the occupational evolution over twelve years can bring significant changes. So a review of the occupation was carried out in 1960, and work on the new standards was begun in February of that year.

The initial survey of the population distribution in the occupation indicated that of approximately 2,200 statisticians then in the Federal service, more than 90% were employed in eight agencies. Because of this concentration it was possible, by following organizational lines and using a predominance of key supervisory jobs, to select a sample of 80 statisticians who could speak knowledgeably about a segment of the occupation involving approximately 1,300 statistical positions. Information was collected through interviews or small group discussions with these 80 statisticians. In addition, for purposes of checking the adequacy of coverage of the occupation, agency personnel offices were asked to provide job descriptions for a representative sample of positions in each agency. Approximately 200 job descriptions were collected and reviewed.

This information was organized into a tentative draft of standards which was distributed in September 1960 to statisticians and personnel officers throughout the Federal Government. The request for comment on the tentative draft brought 108 memoranda of criticism and suggestion—some of them 5 and 6 pages long. These memoranda represented the consideration and opinion of considerably more than 108 people. Respondents were about evenly divided between personnel practitioners and statisticians, and their comments contained several hundred suggestions ranging from a single word change to recommendations for changes in basic concepts. The detailed analysis of these comments guided the revisions to the tentative draft which resulted in the final standard. A number of statisticians had returned carefully annotated copies of the tentative draft and these were especially helpful in sharpening technical language and clarifying technical concepts.

The new standards differ from the previous standards published in 1948 in several important ways. The most fundamental change is the separation of the mathematical statistician into a new occupational series. Two factors indicated the change was necessary. First, qualification requirements for mathematical statistician positions differ from those of the other positions under study. Second, very little transfer of personnel is possible from survey or subject-matter statistician positions to mathematical

statistician because of the specialized requirements, and in practice there is virtually no exchange from mathematical to other types of statistical jobs.

Another important innovation in the new standard was the provision for use of the "Guide for Evaluation of Positions in Basic and Applied Research" for determining grade levels of mathematical statistician positions. This job evaluation tool developed last year by the Civil Service Commission is used to measure the grade levels of professional positions in the physical and biological sciences and related disciplines. The decision to include mathematical statistician positions with those covered by the Guide was based on an analysis of the typical professional attitudes and associations of mathematical statisticians, the required educational patterns and recruitment sources for beginners in the profession, and the scientific character of the discipline which controls the profession.

For the Statistician Series (now excluding Mathematical Statistician) differences between the new standards and the ones they replace are less dramatic. The title of the series is changed from Statistics to Statistician Series to emphasize the professional character of the occupation; the word "analytical" is eliminated from the title of subject-matter statistician jobs to provide a more accurate and less awkward titling pattern; in the other type of position, Survey Statistician, reference to subject-matter fields is deleted because the grade-controlling skill and requirements are not primarily dependent upon subject-matter knowledge. The criteria for determining grade levels have been reorganized and redefined, and the text shortened and simplified.

In summary, these new Government standards for statistician positions contain several important changes in occupational structure. First, they differentiate clearly between professional statistical work and work which involves the handling of quantitive data by other than statistical methods. Second, they relate the mathematical statistician with the scientific community of occupations and strengthen the demarcation between statistical jobs involving analysis and interpretation of subject-matter data and those concerned mainly with the planning and execution of surveys. Finally, they clarify the differences between professional statistical work and the related work of the subject-matter specialist, the mathematician or the specialist in electronic data processing.

The changes incorporated in the new standards mirror the modern statistician's attitudes about his professional discipline—attitudes which are demanding a more rigid interpretation of professionalism in statistical work and clearer delineations between statistical specializations. These new standards viewed in relation to the earlier ones suggest a direction in the growth pattern of the profession as statisticians move to meet new responsibilities developing out of advances in statistical theory and technology.

Copies of the new CSC occupational standards for Statistician and Mathematical Statistician may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. by requesting the February 1961 issue of *Position Classification Standards.* ——*Jane Samuels, Civil Service Commission.*

NSF Committee for Economic and Statistical Studies on Science

The National Science Foundation has announced the appointment of an Advisory Committee for Economic and Statistical Studies on Science and Technology, established to assist in the program activities of the Office of Special Studies. The first meeting, which was primarily to brief the members on the program of the Office, was held on March 6 and 7.

Members of the Committee are: Chairman, Ralph J. Watkins, Director of Economic Studies, The Brookings Institution; Gerhard Colm, Chief Economist, National Planning Association; Everett M. Kassalow, Director of Research, Industrial Unions Department, AFL-CIO; John W. Kendrick, Professor of Economics, George Washington University; Wayne E. Kuhn, Manager, Technical and Research Division, The Texas Company; Albert Rubenstein, Professor of Industrial Engineering, Northwestern University; Herbert Stein, Director of Research, Committee for Economic Development; Charles E. Mack, Jr., Chief of Research, Grumman Aircraft Engineering Corporation; and Theodore W. Schultz, Professor of Economics, University of Chicago.——*Jacob Perlman, Head, Office of Special Studies, National Science Foundation*

Scammon New Census Director

Richard M. Scammon, who has been designated as Director, U.S. Bureau of the Census, has been associated with the Governmental Affairs Institute in Washington for the past six years, and, at the time of his designation was a consultant with Louis Harris and Associates, New York election research analysts. He has served on a number of committees advisory to the Bureau of the Census and was a principal consultant in the preparation of *Historical Statistics of the United States—Colonial Times to 1957.*

A graduate of the University of Minnesota, Mr. Scammon has an M.A. from the University of Michigan and has also studied at the London School of Economics. During World War II and afterwards he was with military government in Germany, then, in 1948, was Chief of the Division of Research for Western Europe in the Department of State. In 1955 he joined the Governmental Affairs Institute as Director of Elections Research.

In 1958 Mr. Scammon was chairman of the U.S. delegation to observe elections in the Soviet Union and the following year was guest observer at the elections to the Israeli Knesset.

USDA Reorganizes Services

The U.S. Department of Agriculture has announced a plan to reorganize its economics research and statistical reporting functions. These activities, previously assigned to the Agricultural Marketing Service, Agricultural Research Service, and Foreign Agricultural Service, are being brought together to form an Economics Research Service and a Statistical Reporting Service under a Director of Agricultural Economics. Pending official action to place in effect the organizational changes, Dr. Willard W. Cochran, University of Minnesota agricultural economist, has been designated as Acting Director.

Confidentiality of Census Questionnaires

On November 7, 1960, the United States Supreme Court refused to review a case in which the United States Court of Appeals for the Seventh Circuit decided that the Federal Trade Commission cannot compel a manufacturer to produce his file copy of the report he made to the Bureau of the Census for the census of manufactures (reported in the December issue). On December 16, the Court of Appeals for the Second Circuit took the opposite view. It held that the legal provisions for keeping census data confidential apply only to the Department of Commerce and that the Federal Trade Commission can require the manufacturer to produce his file copy of the report. In the light of this development, the Supreme Court has now decided to review this matter.

Among Recent Publications

PUBLICATIONS AVAILABLE FROM SUPERINTENDENT OF DOCUMENTS, GOVERNMENT PRINTING OFFICE, WASHINGTON 25, D.C.

Department of Commerce, Business and Defense Services Administration

Directory of National Associations of Businessmen: 1960 (50¢)

Department of Commerce, Bureau of Standards

Journal of Research, Sec. B, Jan.-Mar. 1961 (vol. 65 B No. 1. Annual subscription $2.25)

—Haight, Frank A, Index to the Distributions of Mathematical Statistics

—Deming, Lola S. and D. Gupta, Selected Bibliography of Statistical Literature, 1930 to 1957: IV. Markov Chains and Stochastic Processes.

Department of Labor, Bureau of Employment Security

Technical Occupations in Research, Design, and Development Considered as Directly Supporting to Engineers and Physical Scientists (111 pages, 50¢)

Treasury Department, Internal Revenue Service

Statistics of Income, 1958, Fiduciary, Gift, and Estate Tax Returns (116 pages, 70¢)

Statistics of Income, 1958-59, Corporation Income Tax Returns (274 pages, $1.50)

Public Health Service, National Health Survey

Hospitalization in the Last Year of Life (PHS Pub. No. 584-D3, 30¢)

Acute Conditions, Seasonal Variations, United States, July 1957-June 1960 (PHS Pub. No. 584-B24, 35¢)

Hernias Reported in Interviews, United States, July 1957-June 1959 (PHS Pub. No. 584-B25, 25¢)

National Science Foundation

Reviews of Data on Research and Development

No. 24—Funds for Performance of Research and Development in American Industry, 1959 (10¢)

No. 25—Funds for Research and Development in Agricultural Experiment Stations and Agricultural Colleges in the U. S., Fiscal Year, 1958 (10¢)

No. 26—Research and Development and the Gross National Product (10¢)

U. S. Congress

Government Price Statistics, Hearings before the Joint Economic Committee, Subcommittee on Economic Statistics Jan. 24, 1951 (526 pp. $1.50). Includes the report prepared by the NBER (Stigler report) on Government Price Statistics.

House Document 54 (278 pages, 70¢)

Final Report of the Highway Cost Allocation Study (submitted by the Secretary of Commerce) includes Part I, introduction and summary of findings; Part II, general discussion; Part III, allocation of highway costs between private and commercial users and other classes and interests; Part IV, the allocation of the Federal-aid system among vehicles of different dimensions, weights, and other specifications; and Part V, competition of highways with other modes of transportation.

House Document No. 72 (82 pages, 25¢)

Final report of the Highway Cost Allocation Study Part VI. Studies of the Economic and Social Effects of Highway Improvement.

PUBLICATIONS WHICH CAN BE OBTAINED FROM THE PRODUCING AGENCIES

Division of Administrative Services, Board of Governors of the Federal Reserve System

Industrial Production Chart Book ($1.75)

Division of the Actuary, Social Security Administration, Washington 25, D.C.

Jones, John P. and Marice C. Hart, Analysis of Benefits OASDI Program, 1960 Amendments (Actuarial Study No. 50)

Publications Unit, Bureau of the Budget, Washington 25, D.C.

Federal Fiscal Behavior During the Recession of 1957-58 *(limited number of copies)*

Ten-Year Projection of Federal Budget Expenditures *(limited number of copies)*

Bureau of the Census, Washington 25, D.C. (or any Department of Commerce Field Office)

Preliminary reports on Irrigation of Agricultural Lands (Western or Dry Areas) will include reports for 18 States and an area summary (10¢ per copy)

National Science Foundation, Printing and Publications Office, Washington, 25, D.C.

Scientific Manpower Bulletin No. 12—1960 Salaries and Characteristics of Scientists in the National Register of Scientific and Technical Personnel *(limited number of copies)*

Statistics Division, Internal Revenue Service, Washington 25, D.C.

News release of Dec. 31, 1960, Advance summary data for individual tax returns for the income year 1959.

Corrigenda To 1960 Proceedings of the Social Statistics Section, pp. 196–205

Koop, J. C. "On theoretical questions underlying the technique of replicated or interpenetrating samples."

(1) The symbol, S', which appears in the third line above formula (11) should be read S_i. In Formula (11) and in the seventh line in the text below Formula (12) this symbol appears and should be corrected accordingly.

(2) Formula (12) should now appear as

$$T_r = \frac{1}{P_s} \sum_{i \alpha} \frac{a_i f_i}{S_i} \qquad (12)$$

It should be noted that the S_i (for all i in the population) are not necessarily equal.

(3) In formulas (24) and (25) the symbol X_i' appearing after the summation sign should be replaced by $\frac{X_i'}{P_i}$.

(4) The sentence after formula (25) should now be read:

$$\text{We find } E\left(\sum_{i=1}^{m} \frac{X_i'}{P_i} \middle| i \epsilon s\right) = \sum_{i=1}^{m} \frac{X_i}{P_i} \quad \text{and} \quad E\left(V\left(\sum_{i=1}^{m} \frac{X_i'}{P_i} \middle| i \epsilon s\right)\right) = E \sum_{i=1}^{m} V\left(\frac{X_i'}{P_i}\right) = mE\left(V\left(\frac{X_i'}{P_i}\right)\right).$$

(5) In formulas (26) and (30) X_i' should be replaced by $\frac{X_i'}{P_i}$ and X_i by $\frac{X_i}{P_i}$.

(6) On p. 201 the heading for section 4 should be read *Confidence limits for finite population values.*

CONFIDENCE INTERVAL INFERENCE AND SAMPLE SIZE DETERMINATION

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1. Introduction

A number of recent publications have emphasized the particular utility of confidence interval estimation as a tool of statistical inference. These include work by Davies (5), Natrella (8), Snedecor (9), and Tukey (10), among others. The present note is prompted by the frequent, if not ubiquitous, lack of distinction between two problems involving confidence inference: that of determining sample size in an enumerative[1] survey on the one hand, as opposed to that of determining sample size in an analytic[1] survey on the other. (Precisely analogous distinctions apply to absolute experiments as opposed to comparative experiments, Anscombe (1), with respect to the problem of determining number of replications from the point of view of confidence inference. However, the present discussion will be given in terms of surveys.)

2. Sample Size Determination in an Enumerative Survey

Two cases arise corresponding to whether the stipulation of the precision required in the estimate is made in I) absolute or II) relative terms. These are emphasized, for example, by Cochran (2), and by Hansen, Hurwitz, and Madow (7), respectively. To clarify the matter, suppose a sample survey utilizing a simple random sample design,[2] with negligible finite population correction, is to be made in order to estimate the prevalence rate,[3] μ, of tuberculosis in a particular population (e.g., cf Cornfield (4). For an enumerative survey, the customary procedure for the determination of sample size, based upon the confidence interval approach, consists of the following three steps.

1) The precision with which it is desired to estimate μ is specified at the outset. This step subdivides into a specification of either I) absolute or II) relative precision.

I) Absolute precision. In this case it is stipulated that the estimate $\hat{\mu}$ be within a desired amount, say d, of the true μ. For example, $\hat{\mu}$, the estimated fraction with tuberculosis in the population is to be correct to within ± 0.008 of μ, i.e., $|\hat{\mu} - \mu| \leq d = 0.008$. This will be referred to as Example 1.

II) Relative precision. Here the estimate $\hat{\mu}$ is to be within a specified percentage, say $D\%$, of the true μ. For example, $\hat{\mu}$, the estimated proportion of tuberculors in the population is to be correct to within $\pm 20\%$ of μ, i.e.,

$$\frac{100\,|\,\hat{\mu} - \mu\,|}{\mu} \leq D\% = 20\%.$$

This will be referred to as Example 2.

2) The second step is to specify in advance a confidence coefficient, $1 - \alpha$, with which it is desired to attain the precision stated in 1.)

I) If absolute precision was stipulated in 1) then the confidence coefficient is determined by

$$\text{Prob}\{|\,\hat{\mu} - \mu\,| \leq d\} = 1 - \alpha. \qquad [1]$$

In Example 1, using a confidence coefficient of 99%, we have Prob $\{|\hat{\mu} - \mu| \leq 0.008\} = 0.99$.

It is customary in sample surveys, (2), (7), to apply the normal curve as a model for the sampling distribution of $\hat{\mu}$. Let Z denote a standardized normal variate.[4]

Then

$$Z = \frac{\hat{\mu} - \mu}{SE(\hat{\mu})}$$

and equation [1] becomes

$$\text{Prob}\{|\,\hat{\mu} - \mu\,| \leq d\}$$

$$= \text{Prob}\left\{\frac{|\,\hat{\mu} - \mu\,|}{SE(\hat{\mu})} = |\,Z\,| \leq \frac{d}{SE(\hat{\mu})}\right\} = 1 - \alpha.$$

We thus have the relationship

$$\frac{d}{SE(\hat{\mu})} \geq Z_{1-\alpha/2}. \qquad [2]$$

In Example 1, $\dfrac{0.008}{SE(\hat{\mu})} \geq 2.58$.[5]

II) If relative precision was stipulated in 1), then the confidence coefficient is determined by

$$\text{Prob}\{100\,|\,\hat{\mu} - \mu\,|/\mu \leq D\%\} = 1 - \alpha. \qquad [3]$$

In Example 2, taking $1 - \alpha$ as 99%, we have

[1] In an enumerative survey, the aim is to describe certain "characteristics of the population," whereas an analytic survey involves" the study of relationships within the population," (2, pp. 106, 107). The distinction is exemplified in section 3 below.

[2] Analogous procedures apply to more complex designs.

[3] In case multiple inferences arise, analogous techniques would involve a modification based on an approach such as Tukey's (9).

[4] In comparative experiments' Student's t distribution is often used in place of the distribution of Z.

[5] The variable in the examples of this paper is binomial, hence in some cases a problem may arise concerning the use of the normal curve model. For binomial data, the adequacy of the model may be checked, Cochran [2, p. 41]. In doubtful cases, perhaps the most useful alternative is to increase the applicability of the normal model by a preliminary transformation such as Fisher's inverse size transformation. (6)

$$\text{Prob}\{100 \mid \hat{\mu} - \mu \mid /\mu \leq 20\%\} = 0.99.$$

The equation corresponding to [2], based upon the normal deviate, is:

$$\frac{D\%}{CV(\hat{\mu})} \geq Z_{1-\alpha/2} \qquad [4]$$

where $CV(\hat{\mu})$ is the percentage coefficient of variation of $\hat{\mu}$ defined here as $100\ SE(\hat{\mu})/\mu$. The equation [4] is derived from [3] as follows.

$$\text{Prob}\{100 \mid \hat{\mu} - \mu \mid /\mu \leq D\%\}$$

$$= \text{Prob}\left\{\frac{100 \cdot \mid \hat{\mu} - \mu \mid /\mu}{100\ SE(\hat{\mu})/\mu} = \mid Z \mid \leq \frac{D\%}{100\ SE(\hat{\mu})/\mu}\right\}$$

$$= 1 - \alpha.$$

That is,

$$\text{Prob}\left\{100\ \frac{\mid \hat{\mu} - \mu \mid /\mu}{CV(\hat{\mu})} = \mid Z \mid \leq \frac{D\%}{CV(\hat{\mu})}\right\} = 1 - \alpha$$

from which [4] follows. Equation [4] applied to Example 2 gives:

$$\frac{20\%}{CV(\hat{\mu})} \geq 2.58.$$

3. The third and final step is a specification of the variation in the population, as measured by σ (or more realistically, the specification of an upper bound on σ). This follows from the fact that for *I*) the equation [2] involves $SE(\hat{\mu})$ and for *II*) the equation [4] involves $CV(\hat{\mu})$, and that both of these functions involve σ.

I) If absolute precision was stipulated in 1), we must consider that $SE(\hat{\mu}) = \sigma/\sqrt{n}$. Hence the equation [2] becomes:

$$\frac{d}{\sigma/\sqrt{n}} \geq Z_{1-\alpha}$$

so that

$$n \geq Z^2_{1-\alpha}\sigma^2/d^2 \qquad [5]$$

a solution of the sample size problem for I). In Example 1, if σ[6] is at most 0.10, then from [5], we have $n \geq (2.58)^2(0.10)^2/(0.008)^2 = 1040$.

II) If relative precision was stipulated in 1), the fact is used that

$$CV(\hat{\mu}) = 100\ SE(\hat{\mu})/\mu = 100\sigma/\sqrt{n}/\mu = CV/\sqrt{n}$$

where $CV = 100\sigma/\mu$ is the population percentage coefficient of variation. Then the equation [4] becomes

$$\frac{D\%}{CV/\sqrt{n}} \geq Z_{1-\alpha}$$

so that

$$n \geq Z^2_{1-\alpha}CV^2/D^2\% \qquad [6]$$

a solution of the sample size problem for II). In Example 2, if CV is at most 1000%, then from [6], we have $n \geq (2.58)^2(1000)^2/(20)^2 = 16{,}641$.

[6] The variable in the example is binomial and so $\sigma = \sqrt{\mu(1-\mu)}$.

3. Sample Size Determination in an Analytic Survey

In an analytic survey (and analogously in a comparative experiment), statistical inference is focused upon comparisons. For example, instead of a single tuberculosis prevalence rate, μ, from the overall population, attention may center upon the difference, $\mu_1 - \mu_2$, between prevalence rates in two strata of the total population, e.g., the contrast between the colored and white subpopulations, (4). (For comparative experiments, an analogous comparison of common interest is $\mu_T - \mu_C$, the contrast of the average for T, a treated group of experimental units, and for C, a control group of experimental units. Cochran and Cox (3) give numerous examples wherein experimental comparisons are of interest.)

As judged by accounts such as those found in (8), the use of confidence interval estimation as a technique of statistical inference concerning comparisons has been restricted to the case, I, of an absolute precision specification. However, just as in enumerative surveys (or absolute experiments), actually two types of precision specification are possible in analytic surveys (and similarly in comparative experiments), viz: I) absolute and II) relative precision. Instead of three steps only as in 2. above, it now becomes necessary to add a fourth step—what will be termed the specification of allocation. Moreover, of even greater significance, it turns out as indicated below, that in II) a fifth step is required, viz, the specification of a lower bound on the comparison.

Hence for an analytic survey, the procedure for the determination of sample size consists of four steps (not three) if absolute precision is used. But when relative precision is desired, five steps are needed. Thus:

1) The first step is a specification of the precision with which, say, $\mu_1 - \mu_2$ is to be estimated. This step is divisible into one of two substeps.

I) Absolute precision. Here it is desired that the estimate $\hat{\mu}_1 - \hat{\mu}_2$ be within a particular magnitude, d, of the true comparison $\mu_1 - \mu_2$. For example, the estimated difference $\hat{\mu}_1 - \hat{\mu}_2$ in prevalence rates between the colored and white subpopulations is to be correct to within ± 0.004 of $\mu_1 - \mu_2$, i.e.,

$$\mid (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2) \mid \leq d = 0.004.$$

This will be referred to as Example 3.

II) Relative precision. Here it is planned that the estimate $\hat{\mu}_1 - \hat{\mu}_2$ is to be, in absolute value, within a specified percentage, say $D\%$ of the true $\mid \mu_1 - \mu_2 \mid$. For example, $\mu_1 - \mu_2$, the estimated difference in prevalence rates between the colored and white strata is to be correct to within $\pm 20\%$ of $\mid \mu_1 - \mu_2 \mid$, i.e., $100 \mid (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2) \mid / \mid \mu_1 - \mu_2 \mid \leq D\% = 20\%$. This will be referred to as Example 4.

2) The second step is to specify in advance a confidence coefficient, $1-\alpha$, with which it is desired to attain the precision stated in 1).

I) If absolute precision was stipulated in 1), then the confidence coefficient is determined by

$$\text{Prob}\{\mid (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2) \mid \leq d\} = 1 - \alpha. \qquad [7]$$

In Example 3, using a confidence coefficient of 99%, we have Prob $\{|\ (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2)\ | \leq 0.004\} = 0.99$.

Again employing the normal curve, we have from [7],

$$\text{Prob}\ \{|\ (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2)\ | \leq d\}$$

$$= \text{Prob}\left\{\frac{|\ (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2)\ |}{SE(\hat{\mu}_1 - \hat{\mu}_2)}\right.$$

$$\left. = |\ Z\ | \leq \frac{d}{SE(\hat{\mu}_1 - \hat{\mu}_2)}\right\} = 1 - \alpha$$

$$\text{so that}\ \frac{d}{SE(\hat{\mu}_1 - \hat{\mu}_2)} \geq Z_{1-\alpha/2}. \qquad [8]$$

$$\text{In Example 3,}\ \frac{0.004}{SE(\hat{\mu}_1 - \hat{\mu}_2)} \geq 2.58.$$

II) If relative precision was stipulated in 1), then the confidence coefficient is determined by

$$\text{Prob}\ \{100\ |\ (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2)\ |/|\ \mu_1 - \mu_2\ | \leq D\%\} = 1 - \alpha. \qquad [9]$$

In Example 4, taking $1 - \alpha$ as 99%, we have

$$\text{Prob}\ \{100\ |\ (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2)\ |/|\ \mu_1 - \mu_2\ | \leq 20\%\} = 0.99$$

The equation corresponding to [8], based upon the normal distribution, is:

$$\frac{D\%}{CV(\hat{\mu}_1 - \hat{\mu}_2)} \geq Z_{1-\alpha/2}. \qquad [10]$$

Equation [10] is derived from [9] as follows.

$$\text{Prob}\ \{100\ |\ (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2)\ |/|\ \mu_1 - \mu_2\ | \leq D\%\}$$

$$= \text{Prob}\left\{\frac{100\ |\ (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2)\ |/|\ \mu_1 - \mu_2\ |}{100\ SE(\hat{\mu}_1 - \hat{\mu}_2)/|\ \mu_1 - \mu_2\ |}\right.$$

$$\left. = |\ Z\ | \leq \frac{D\%}{100\ SE(\hat{\mu}_1 - \hat{\mu}_2)/|\ \mu_1 - \mu_2\ |}\right\}$$

That is,

$$\text{Prob}\left\{\frac{100\ |\ (\hat{\mu}_1 - \hat{\mu}_2) - (\mu_1 - \mu_2)\ |/|\ \mu_1 - \mu_2\ |}{CV(\hat{\mu}_1 - \hat{\mu}_2)}\right.$$

$$\left. = |\ Z\ | \leq \frac{D\%}{CV(\hat{\mu}_1 - \hat{\mu}_2)}\right\} = 1 - \alpha$$

from which [10] follows. Applying equation [10] to Example 4 gives

$$\frac{20\%}{CV(\hat{\mu}_1 - \hat{\mu}_2)} \geq 2.58.$$

3. Again specification of variability arises as the third step. This is not the final step now, however, as will appear.

I) In the absolute precision case must be considered the relationship

$$SE(\hat{\mu}_1 - \hat{\mu}_2) = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}.$$

Hence evidently a specification of, or upper bounds on, both σ_1 and σ_2 is required. However, this third step is clearly not sufficient in this analytic survey situation—to yield a formula for n—as contrasted with the case of the enumerative survey in 2. above in which the corresponding step resulted in equation [5]. In the present situation $n = n_1 + n_2$ so that a fourth step is required.

II) The need for a fourth step is also clear in the relative precision case, since

$$CV(\hat{\mu}_1 - \hat{\mu}_2) = 100\ SE(\hat{\mu}_1 - \hat{\mu}_2)/|\ \mu_1 - \mu_2\ |.$$

$$= 100\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}\Big/\ |\ \mu_1 - \mu_2\ |.$$

Thus the necessity for a specification of σ_1 and σ_2 is apparent, as well as for a fourth step involving the allocation of n_1 and n_2. Moreover, a new problem is suggested requiring the a priori specification of new information, viz., a stipulation about the departure of $|\ \mu_1 - \mu_2\ |$ from zero. This does not arise in I), absolute precision. It is considered in step 5 below for II) only, relative precision.

4. The fourth step is to specify in advance allocation weights, say w_1 and w_2, defined by

$$n_1 = w_1 n, \qquad n_2 = w_2 n \qquad [11]$$

$$w_1 + w_2 = 1.$$

Perhaps most common in practice is the case $w_1 = w_2 = \frac{1}{2}$, equal size subsamples. Of course step 4 is not restricted to this situation which might be deemed most appropriate when $\sigma_1 = \sigma_2$ and the cost of sampling the two strata is the same. More general criteria are available, based upon principles of optimum allocation for analytic surveys and embodying variable costs and standard deviations, (2).

I) From step 3.1), and equation (11), we have

$$SE(\hat{\mu}_1 - \hat{\mu}_2) = \sqrt{\frac{\sigma_1^2}{w_1 n} + \frac{\sigma_2^2}{w_2 n}} = \sqrt{\frac{\sigma_1^2}{w_1} + \frac{\sigma_2^2}{w_2}}\Big/\sqrt{n}.$$

Hence the equation [8] becomes

$$\frac{d}{\sqrt{\frac{\sigma_1^2}{w_1} + \frac{\sigma_2^2}{w_2}}\Big/\sqrt{n}} \geq Z_{1-\alpha/2}$$

so that

$$n \geq Z_{1-\alpha/2}^2\left(\frac{\sigma_1^2}{w_1} + \frac{\sigma_2^2}{w_2}\right)\Big/\ d^2 \qquad [12]$$

a solution of the sample size problem for I). In Example 3, if σ_1 is at most 0.17, σ_2 is at most 0.10, and if it is stipulated that $w_1 = \frac{1}{2}$ and $w_2 = \frac{1}{2}$, then, from [12], we have

$$n \geq (2.58)^2\left[\frac{(0.17)^2}{\frac{1}{2}} + \frac{(0.10)^2}{\frac{1}{2}}\right]\Big/\ (0\ \ )^2 = 32{,}367.$$

II) From step 3 II), and equation [11], we have

$$CV(\hat{\mu}_1 - \hat{\mu}_2) = 100\sqrt{\frac{\sigma_1^2}{w_1 n} + \frac{\sigma_2^2}{w_2 n}}\Big/\ |\ \mu_1 - \mu_2\ |$$

$$= 100\sqrt{\frac{\sigma_1^2}{w_1} + \frac{\sigma_2^2}{w_2}} \Big/ \sqrt{n}\,|\,\mu_1 - \mu_2\,|.$$

Hence the equation [10] becomes

$$\frac{D\%}{100\sqrt{\frac{\sigma_1^2}{w_1} + \frac{\sigma_2^2}{w_2}} \Big/ \sqrt{n}\,|\,\mu_1 - \mu_2\,|} \geq Z_{1-\alpha/2}$$

so that

$$n \geq Z_{1-\alpha/2}^2\left(\frac{\sigma_1^2}{w_1} + \frac{\sigma_2^2}{w_2}\right)100^2/D^2\%(\mu_1 - \mu_2)^2 \qquad [13]$$

But equation [13] does *NOT* provide a solution of the sample size problem for II because the preceding steps, although providing for all other ingredients in [13], do not stipulate the expression $(\mu_1 - \mu_2)^2$ which, if small, would entail a very large n. Of course $\mu_1 - \mu_2$ is precisely the quantity being estimated so it is unknown. However, it is clear from [13] that a step concerning the magnitude of $(\mu_1 - \mu_2)^2$ must be taken. We are thus led to step five.

5) The final step required for II) (but not needed for I) is the statement that, in view of the preceding steps 1 and 2, one must specify a positive number δ such that $|\,\mu_1 - \mu_2\,| \geq \delta > 0$. That is, δ is stipulated as the smallest absolute value of the comparison, $|\mu_1 - \mu_2|$, to possess substantive interest to the investigator so that it is desired to perform the interval estimation with the precision and confidence stated in steps 1 and 2. Hence if $|\,\mu_1 - \mu_2\,|$ happens to be less than δ, this state of affairs is of diminished scientific importance so less precision is required. On the other hand, if in fact $|\,\mu_1 - \mu_2\,| > \delta$, then the n given by [13] will result in a sample of greater precision than specified in 1.

Of course, an actual lower bound on $|\,\mu_1 - \mu_2\,|$ need not be known to proceed thus. Rather the step is based upon the fact that it should often be possible to specify δ as that difference, $|\,\mu_1 - \mu_2\,|$, which is the smallest possible value of the contrast to possess substantive interest for the investigator (i.e., the smallest of "practical significance").

For Example 4, let us assume in this fashion that $\delta = 0.03$, i.e., the difference in prevalence rates between the colored and white strata must reach or exceed this value of 0.03 in order to be considered of practical consequence (medically, say, or sociologically, or politically, etc). We may then summarize this example by stating that it is desired to determine sample size so as to estimate the difference in prevalence rates between the colored and white populations to within 20% of the true difference, with a confidence coefficient of 99%, provided that the true difference is greater than or equal to 0.03. Hence, from [13],

$$n \geq (2.58)^2\left[\frac{(0.17)^2}{\frac{1}{2}} + \frac{(0.10)^2}{\frac{1}{2}}\right]\cdot 100^2/(20)^2(0.03)^2$$

$$= 14{,}385.$$

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Some Questions to Our Readers at Large—Academic Chapters?

To assist us in serving the needs of an expanding statistical community we would like interested readers to supply answers to the following questions:

(1) Is there a statistical society at the university, college or high school that you are or were associated with? (If the answer is yes, please write the name and address of the school).

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Please address replies to: Ernest Rubin, American Statistical Association, 1757 K Street N.W., Washington 6, D. C.

COMPUTATION OF t BY ANALYSIS OF VARIANCE

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Various computational formulas for t by Knapp,[1] Bangdiwala,[2] Dossett,[3] Cureton,[4] Dwyer,[5] and Cole[6] have appeared in THE AMERICAN STATISTICIAN. The purpose of these formulas is to reduce the time and effort required to run t-tests. The conventional formulas probably are somewhat more time consuming than the ones suggested by the writers cited. However, the analysis of variance method[7] requires little additional effort and probably produces greater understanding than any of the suggested approaches.

Two groups of chemistry students were randomly chosen from subpopulations having the same criterion. Each subpopulation had identical teaching except that one group viewed several films outside of class. The criterion was the score on the final examination. The basic data for these groups appear in Table 1.

Table 1

SUM OF SCORES AND SUM OF SCORES SQUARED FOR TWO GROUPS—CHEMISTRY EXAMINATION

Group	N	ΣX	ΣX^2
I	21	859	38,349
II	28	1,069	45,265
Total	49	1,928	83,614

The sums of squares for the separate groups and the total may be obtained by using the following formula:

$$SS = \frac{N\Sigma X^2 - (\Sigma X)^2}{N}.$$

The SS obtained were as follows:

1. Group I = 3,211.81
2. Group II = 4,452.11
3. Within Groups = 3,211.81 + 4,452.11 = 7,663.92
4. Total = 7,753.10
5. Between Groups = 7,753.10 − 7,663.92 = 89.19

Table 2 shows a rudimentary analysis of variance. It is based on the assumption that each score is composed of two additive quantities, a "between group" effect representing the influence of the extra films and a "within group" effect based on all other factors.

Entering the F table with $n_1 = 1$ and $n_2 = 47$, we accept the null hypothesis and conclude that the means of the two groups do not differ significantly from each other.

The equivalent t value may be obtained by using any of the following formulas:

(1) Formula for t when the numerator of F has but a single degree of freedom.[8]

$$t = \sqrt{F} = \sqrt{0.55} = 0.74$$

Table 2

ANALYSIS OF VARIANCE

Source of Variation	d.f.	SS	MS	F
Within Groups	47	7,663.92	163.06	
Between Groups	1	89.18	89.18	0.55
Total	48	7,753.19		

(2) Conventional formula.[9]

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{\Sigma x_1^2 + \Sigma x_2^2}{N_1 + N_2 - 2}\right)\left(\frac{N_1 + N_2}{N_1 N_2}\right)}}$$

$$t = \frac{40.90 - 39.19}{\sqrt{\left(\frac{3{,}211.81 + 4{,}452.11}{28 + 21 - 2}\right)\left(\frac{21 + 28}{21 \cdot 28}\right)}} = 0.74.$$

(3) Alternative formula.[10]

$$t = \sqrt{\frac{(M-2)(N_2 a - N_1 b)^2}{M(N_1 N_2 c - N_2 a^2 - N_1 b^2)}}$$

$$t = \sqrt{\frac{(49-2)(28 \cdot 859 - 21 \cdot 1{,}069)^2}{49[21 \cdot 28 \cdot 83{,}614 - 28(859)^2 - 21(1{,}069)^2]}} = 0.74,$$

where N_1 = the number of cases in the first group.
N_2 = the number of cases in the second group.
$M = N_1 + N_2$.
a = the sum of the scores in the first group.
b = the sum of the scores in the second group.
c = the sum of the scores squared in both groups.

The three formulas (1, 2, and 3) must yield exactly the same numerical value for t since they are mathematically the same. The method of analysis of variance seems to the writer the easiest and most meaningful of the three.

When the correlation is involved, as is the case with matched pairs or two observations on a single individual, one may also use the analysis of variance method. The group of students represented in Table 3 was randomly chosen from one of the subpopulations mentioned previously. The criterion was the same. However, an alternative form of the final examination was administered as a pretest. Let us apply the method to the data in Table 3.

The following sums of squares are needed:

1. SS from all the 42 pretest and posttest scores, i.e.: total SS: $\frac{N\Sigma X^2 - (\Sigma X)^2}{N} = 6{,}076.48.$

2. SS for Tests:

$$\frac{2[(\Sigma X_1)^2 + (\Sigma X_2)^2]}{N} - \frac{[\Sigma(X_1 + X_2)]^2}{N} = 2{,}883.43$$

where N = total number of pretest and posttest scores.

3. SS for Students:

$$\frac{\Sigma(X_1 + X_2)^2}{2} - \frac{[\Sigma(X_1 + X_2)]^2}{N} = 2{,}695.48$$

where N = total number of pretest and posttest scores.

4. Residual SS = Total SS − Tests SS − Students SS = 497.57.

Table 3

PRETEST AND POSTTEST SCORES ON A CHEMISTRY EXAMINATION FOR TWENTY-ONE STUDENTS

Pupil	Pretest (X_1)	Posttest (X_2)	(X_1+X_2)	D	D^2
1	25	38	63	13	169
2	18	44	62	26	676
3	47	53	100	6	36
4	16	35	51	19	361
5	29	58	87	29	841
6	8	28	36	20	400
7	28	45	73	17	289
8	22	34	56	12	144
9	25	41	66	16	256
10	23	37	60	14	196
11	34	60	94	26	676
12	23	49	72	26	676
13	27	37	64	10	100
14	13	36	49	23	529
15	34	55	89	21	441
16	31	40	71	9	81
17	20	29	49	9	81
18	20	36	56	16	256
19	26	29	55	3	9
20	23	39	62	16	256
21	16	33	49	17	289
Totals	508	856	1,364	348	6,762

$\Sigma X_1^2 = 13{,}702$ $\Sigma X_2^2 = 36{,}672$ $\Sigma(X_1 + X_2)^2 = 93{,}986$ $\Sigma X_1 X_2 = 21{,}806$

Application of the appropriate linear model leads to the analysis of variance shown in Table 4.

The F value, 115.89, is the ratio of the mean square for tests to the residual mean square.

(1) Formula for t when the numerator of F has but a single degree of freedom[11] yields:

$$t = \sqrt{F} = 10.77.$$

TABLE 4

ANALYSIS OF VARIANCE–PRETEST AND POSTTEST SCORES FOR TWENTY-ONE STUDENTS

Source of Variation	d.f.	SS	MS	F
Tests	1	2,883.43	2,883.43	115.89
Students	20	2,695.48	134.77	
Residual	20	497.57	24.88	
Total	41	6,076.48		

Entering the F table with $n_1 = 1$ and $n_2 = 20$ or entering the t table with 20 degrees of freedom, we find the F value or the t value significant and conclude there has been a significant mean gain from pretest to posttest.

(2) Application of the conventional t formula[12] for paired groups yields the following t value:

$$t = \frac{\bar{D}}{\sqrt{\frac{N\Sigma D^2 - (\Sigma D)^2}{N^2(N-1)}}}$$

$$t = \frac{16.57}{\sqrt{\frac{21(6{,}762) - (348)^2}{(21)^2(21-1)}}} = 10.77$$

(3) Application of the following formula by Dossett,[13] yields the following t value:

$$t = \sqrt{\frac{(n-1)(a-b)^2}{nc + nd - 2ne - (a-b)^2}},$$

where n = number of pairs

$a = \Sigma X_1 = 508$

$b = \Sigma X_2 = 856$

$c = \Sigma X_1^2 = 13{,}702$

$d = \Sigma X_2^2 = 36{,}672$

$e = \Sigma X_1 X_2 = 21{,}806$

$$t = \sqrt{\frac{(21-1)(508-856)^2}{21(13{,}702) + 21(36{,}672) - 2(21)(21{,}806) - (508-856)^2}}$$

$t = 10.77.$

The three formulas (1, 2, and 3) yield exactly the same numerical values for t since they are mathematically equivalent. Again, the method of analysis of variance seems to the writer the easiest of the three to apply.

Perhaps the new computational formulas might be easier if one had a hundred or more t's to compute, but the analysis of variance method could be easily programmed for high-speed computation.

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THE TEACHING OF STATISTICS IN COSTA RICA

ROBERTO SASSO, University of Costa Rica

The teaching of statistics in Costa Rica has taken place almost exclusively in the School of Economics and Social Sciences of the University of Costa Rica, the only University of the country. †

There are about 3600 students attending that Institution, of whom about 400 are enrolled in the School of Economics and Social Sciences. The School offers a curriculum for a career in economics that contains a number of basic courses which all the students have to take, and also courses for four different specializations. It offers the degree of "Licenciado en Ciencias Economicas" with specialization in either: a) Administration and accounting, b) Economics, c) Statistics and d) Insurance.

During the first two years of study all the students take the same courses and in the third year they start branching off but still take some common ones.

The following is the actual curriculum followed by students intending to specialize in statistics:

A. At the central School of the University, School of Sciences and Letters:

First year (common to all students planning to follow a career in a Social Science [Law, Economics, etc.]).

	Hours per week
Foundations of Philosophy	4
History of Culture	4
Introduction to Biology	4
Spanish	4
History of Costa Rican Institutions	4
Principles of Economics	5
Principles of Sociology	4

B. At the School of Economics and Social Sciences:

Second year (for all students entering this school)

	Hours per week
General Mathematics	6
General Statistics	4+(2)
Elementary Accounting	4+(2)
General Economic and Social History	4 s
Economic Theory	4 s
Principles of Administration	4
General Principles of Insurance	4 s
Supervised Studies	4

Third year (common for the branches of Economics, Statistics and Insurance)

	Hours per week
* Money and Banking	4
* Public Administration	4
* Mathematics of Finance	4 s
* Social Accounting I	4 s
Differential and Integral Calculus	4
Statistics and Mathematics for Economists	4+(2)

Fourth year (only for the branch of Statistics)

	Hours per week
* Public Finance & Fiscal Policy	4
* History of Economic Thinking	4
** Economic Analysis	4
Statistical Methods	4+(2)s
Demographic Statistics	4+(2)s
*** Statistical Theory I	4+(2)

Fifth year (only for the branch of statistics)

	Hours per week
* Modern Economics	4
** Introduction to Econometrics	4
Statistical Theory II	4
Sampling Surveys I	4+(2)s
Sampling Surveys II	4+(2)s
Design of Experiments	4

Courses marked with *s* are of one semester. All others are annual courses. Numbers in parentheses indicate number of hours of practice per week.

The following is a brief indication of the contents of the statistics and mathematics courses:

General Mathematics. This is a 6 hours a week, 2 semester course. It is basically a course on Algebra but covers also some aspects of plane analytic geometry.

General Statistics. This is also a two semester course. It covers mainly the subject of descriptive statistics but some time (about 20%) is devoted to give a very general idea of probability, probability distributions and statistical inference, including the study of the Normal curve and some of its applications, like some of the central limit theorem. Also some general notions of sampling surveys are given.

Statistics and Mathematics for Economists. Includes some applications of mathematics in economics (linear and quadratic equations, difference equations and differential and integral calculus). It also includes the study of some aspects of statistics. The Binomial, Poisson and Normal distributions and some of their uses are covered, as well as very general notions of statistical estimation and some simple cases of tests of hypotheses. Also, simple and multiple correlation and regression and methods of time series analysis are studied.

† Editor's Note: The University of Costa Rica was established in 1941 and the School of Economics and Social Sciences in 1943.

* Common to all the branches
** Common to the branch of "Economics"
*** Common to the branch of "Insurance"

Demographic Statistics. Includes the study of techniques of collecting, presenting and analysing demographic data. Studies the composition characteristics of the population, the computation and standardization of rates, calculation of population estimates, etc.

Statistical Methods. Except for the aspects of statistical methods studied in previous courses, this is a course like most of those given with that same name in many U.S. universities.

It includes: t distribution and its uses, χ^2 distribution and its uses, F distribution and some of its uses, including simple analysis of variance; aspects of sampling inspection and quality control.

Statistical Theory I. To a very large extent, Mood's book [1] is used as text. Its first eight chapters are covered, going to a little higher level in some of them. Some aspects of chapters 10, 11 and 12 of that book are also studied.

Statistical Theory II. This is the continuation of the course "Statistical Theory I". It starts with a review of the subject of statistical estimation, covered in that course, and chapters 10, 11 and 12 of Moods book are completed. Also the multivariate normal distribution is studied but in a way different from that used by Mood since by this time the student has studied matrix algebra.

The study of regression and correlation is also carried in this course. The subject of simple and multiple regression is given in a manner similar to the one used by Anderson and Bancroft [2]. The study of correlation includes notions of multiple and partial correlation.

The subject of linear estimation and the analysis of variance is also studied and some aspects of chapters 15 and 16 of Mood's book [1], are covered in a quite general way (sequential tests of hypotheses and distribution free methods).

Sample Surveys I and II. These courses cover the material contained in the first ten chapters of Cochran's book [3] plus some additional practical and theoretical problems. The first one is devoted to teach the fundamentals of sampling and applications of that technique, while in the second one the corresponding theory is studied.

Design of Experiments. Without entering too much into the corresponding mathematical theory, the more common experimental designs are studied, emphasis being placed on applications, limitations, and methods of analysis. It includes: completely randomized design, randomized blocks, latin square, incomplete blocks, analysis of covariance, factorial experiments, confounded factorials and variance components.

Introduction to Econometrics. About $\frac{1}{8}$ of the time is devoted to the study of matrices and determinants. This subject is not included in the course of mathematics and statistics for economists, because of lack of time. Also included are: Scope and method of econometrics; regression and correlation; estimation of aggregative models; econometric models; sector analysis.

Tintner's [4] and Klein's [5] books, combined, are used as texts.

As can be seen, with respect to statistics, the courses offered constitute a quite well rounded program. It is believed that it is about as good a program as those offered in some U.S. universities for the master's degree in statistics.

The University of Costa Rica is in a better position to teach statistics than most of the universities of the neighboring countries of Central America and some of South America. It is hoped that some students of those countries may be interested to come to Costa Rica to study that subject. Special programs can be arranged for students who wish to study statistics but do not want to take the whole program of 5 years of studies.

The professors that teach the different statistics courses are Costa Rican young men who followed graduate studies in the United States and English universities, in statistics, mathematics and economics.

Besides these courses, there are a few other statistics courses in other schools of the University; there is a course in Statistical Methods and one on Design of Experiments, at the School of Agronomy; in the curriculum of the School of Medicine there is a course in Biostatistics; the students of the Department of Physics and Mathematics have to take a course in Statistical Theory. The authorities of the school of microbiology have been feeling, for the last two years or so, the need of a statistics course in their curriculum.

By special agreement, professors of the Institute of Statistics of the University of Costa Rica teach courses of statistical methods and design of experiments, at the Inter American Institute of Agricultural Sciences in Turrialba, Costa Rica.

Outside the University, in some of the schools of commerce, very elementary statistics courses are being taught.

The Institute of Statistics of the University of Costa Rica, mentioned above, was organized in 1955 as part of the School of Economics and Social Sciences. Even though it was recognized that this School was not the correct place in the University to establish such an Institute, it was located there because statistics courses were taught only there.

The preparation of the programs of study and coordination of the different statistics courses which the University of Costa Rica offers are in the hands of the Institute. Most of those courses are being taught by the professors of the Institute.

Exactly the same situation which prevails in Turkey, as described by Wasserman [6] is prevalent in Costa Rica: each year, only five or six students out of nearly one hundred of the School of Economics, elect to specialize in statistics. The reason for this is the fact that the course work is easier and the job opportunities are as good or even better in the other fields of specialization, such as administration and accounting.

There have been very few positions for graduates specialized in statistics in which they can apply what they have learned of the subject. Most of the jobs they get are not "intellectually challenging or rewarding".

They either work for government agencies as statisticians whose duties are those of supervisors of statistical clerks, or they get jobs in some field other than statistics, such as economics, administration, accounting and insurance.

It is hoped that this situation will change (in fact some progress has been made in the last few years), because the Institute of Statistics must "facilitate the use of statistical methods in different fields of knowledge". This is done by the teaching of statistics in other schools of the University, by advising the students and investigators in other fields (of the University and public agencies especially) in the use of statistical methods and by means of conferences and short courses to be offered to different groups of professionals. This last activity is in its planning stage.

Furthermore, it is believed that the small supply of statisticians which is being produced, will, in itself, help to create an adequate demand for their services.

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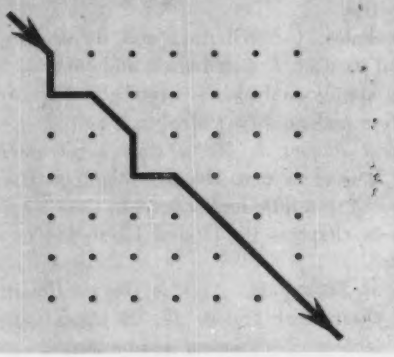

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QUESTIONS & ANSWERS

Devoted to discussions of conceptual and measurement problems . . . . . by ERNEST RUBIN, U. S. Department of Commerce and American University, Washington, D C.

Variations Between U. S. and Its Trading Partner Import and Export Statistics

Discussion by J. Edward Ely

Difficulties of relating the quantitative data of one country to that of another have long been recognized by statisticians, economists and other social scientists. There are two sets of data of principal interest in the field of international comparability, namely, (a) connected or causally related events between two countries recorded by the statistics of such phenomena as foreign trade, international migration, gold transactions, ship and plane movements; and (b) independent events occurring in each country, recorded by the statistics of cost of living, national income, death rates (by cause), literacy, to mention only a few examples.

A question often asked by various consumers of foreign trade statistics is the apparently simple one: Why do the statistics compiled by Country A regarding its annual exports to (or imports from) Country B differ from the statistics issued by Country B regarding its annual imports from (or exports to) Country A? In other words, why do the country statistics differ for what is a connected or similar event?* I wish to thank Mr. J. Edward Ely, Chief of the Foreign Trade Division in the U. S. Bureau of the Census for providing an interesting and useful response to this question.

* * * * *

Export and import statistics are one of the few sets of statistics compiled by the United States for which essentially similar matching statistics relating to presumably the same occurrences are compiled by other countries. These statistics are compiled both in the form of detailed commodity by country cross-classifications (for the U. S. about 150 countries of origin and destination cross-classified by 2600 commodity classifications for exports and 5000 for imports) and in terms of summarized groupings of commodities and countries.

There are many reasons (1) why a comparison of the matching statistics will reveal discrepancies. Among these would be differences in:

coverage, including differences in definition of what types of trade are included in the statistics (government trade; goods entering the economy via warehouse; transit, free port, reexport, and toll or refining trade; etc.) and differences caused by lack of reporting, smuggling, time lags, etc.

commodity classification, including differences in the classification system used and differences due to misclassification

country designation, including differences in definition (consignment, purchase-sale, origin-destination, etc.), differences in physical area considered as included in a country, and differences due to misreporting; is related to such matters as the treatment of transit, free port, reexport, warehouse and toll and refining trade listed under coverage above

valuation, including differences in the definition used (f.o.b., c.i.f., etc.) and differences in reporting arising from such factors as exchange controls, multiple exchange rates, arbitrary valuations, etc.

The type of use made of the statistics of the United States and its trading partners does not usually lead to comparisons of the matching statistics and the discrepancies, therefore, frequently do not become apparent. Import statistics are used by U. S. business (in the detailed commodity classifications) for the purpose of measuring the impact of imports on the domestic market. For this purpose the U.S. import statistics are generally considered sufficient and reference is not made to trading partner statistics. Detailed export statistics are often used by U. S. business to measure the behavior of the export sales of the company; i.e., are its sales gaining or losing as a proportion of total U. S. exports of particular products to particular foreign areas. This limited use requires only the U. S. export statistics. An exporting company would have a better picture of its competitive position if its performance were measured not only against that of its domestic competitors but also against that of its foreign competitors. In this instance the import statistics of consuming countries (or the export statistics of producing countries) would provide the information not supplied solely by the U. S. export statistics. Similarly a domestic producer concerned about foreign competition would have a more complete picture of his situation vis-a-vis competition from imports if he could take into account not only imports into the United States but also changes in the competition pattern in all producer-consumer countries.

While these needs are recognized by business users, they soon find that there are great practical difficulties in attempting to use foreign country statistics. Obstacles arising from differences in language and delays in obtaining detailed statistics of other countries, usually direct him specifically to use the U. S. foreign trade

* The reader should keep in mind that these events are similar and not identical so that a basis in fact exists for some variation between these two sets of "matching" statistics. The time factor can be an important source of variation. During a ship's voyage certain cargo may shrink, rot, or its composition be altered in some other manner.

Table 1

DISTRIBUTION OF 28 SITC GROUP BY COUNTRY CELLS IN THE UNITED STATES IMPORT STATISTICS BY PERCENTAGE VARIATION [1] OF THE UNITED STATES DOLLAR VALUE [2] FIGURE FROM THE MATCHING FOREIGN COUNTRY DOLLAR VALUE FIGURE AND BY VALUE CATEGORIES IN THE UNITED STATES IMPORT STATISTICS, 10 SELECTED COUNTRIES, 1959

U. S. Import Value Percent Variation [1]	Total	Canada	U.K.	Belg.-Lux.	Denmark [3]	France	Germ. Fed.	Neth.	Italy	Japan	Australia
Total	280	28	28	28	28	28	28	28	28	28	28
No U.S. Import Value Shown	93	5	7	12	15	8	6	8	7	8	17
0% (No Export Value Shown)	83	3	7	11	14	8	6	6	6	8	14
∞% (Export Value Shown)	10	2	0	1	1	0	0	2	1	0	3
Less than $100,000	27	4	2	3	3	1	2	3	2	4	3
Under 10%	4	1	0	0	0	0	0	1	1	1	0
10—24%	3	0	1	1	0	0	0	0	0	0	1
25—49%	4	1	0	0	0	0	1	0	1	1	0
50—99%	2	0	0	1	0	0	1	0	0	0	0
100% (No Export Value)	7	0	1	0	1	1	0	2	0	1	1
Over 100%	7	2	0	1	2	0	0	0	0	1	1
$100,000 & less $1,000,000	62	7	5	6	7	9	2	10	6	3	7
Under 10%	9	0	3	1	0	3	0	2	0	0	0
10—24%	7	1	1	2	1	0	0	0	1	0	1
25—49%	11	4	0	0	3	0	1	1	2	0	0
50—99%	17	0	1	3	0	3	0	4	1	1	4
100% (No Export Value)	5	1	0	0	0	0	1	2	0	0	1
Over 100%	13	1	0	0	3	3	0	1	2	2	1
$1,000,000 & over	98	12	14	7	3	10	18	7	13	13	1
Under 10%	32	5	5	2	1	3	5	3	4	4	0
10—24%	28	1	2	2	2	4	4	2	5	5	1
25—49%	14	2	3	1	0	1	4	0	2	1	0
50—99%	17	3	1	1	0	2	4	2	2	2	0
100% (No Export Value)	1	0	0	1	0	0	0	0	0	0	0
Over 100%	6	1	3	0	0	0	1	0	0	1	0

[1] Calculated on the basis of: $\frac{\text{U.S. imports—Foreign country export}}{\text{U. S. imports}} \cdot 100$ (sign ignored)

[2] U.S. import value is essentially f.o.b. exporting country; export value for countries shown is f.o.b. export port except Canada which is f.o.b. original point of shipment, i.e., internal Canada if that is original point of shipment.

[3] Denmark uses a country designation definition of "purchase—sale" which differs substantially from the "production—consumption" or "first consignment—last consignment" used by the U.S. and the other countries shown.

Source: Commodity Trade Statistics, January-December 1959, United Nations Statistical papers, Series D, Vol. IX, No. 4.

statistics. This would occur even if there were not other difficulties of commodity classification, country designation, valuation definitions, coverage, etc. It is the exceptional U. S. business user of U. S. import and export statistics who will be aware of discrepancies between them and the statistics of the U. S. trading partner countries.

Federal Government use of statistics on U. S. imports and exports in terms of detailed commodity classifications tends to follow the pattern of U. S. business use; an exception is in trade agreement negotiations where the detailed statistics of other countries must be used and the existence of discrepancies becomes apparent.

The other major, but less widespread, use of U. S. foreign trade statistics is in terms of broader groupings of commodities (say at most a few hundred). This use generally is by the economic analyst in the Federal Government, in international agencies, and to a more limited extent in business and in academic life. These analysts are concerned with balance of payments problems, the economics of developing countries, the anticipated results of regional economic unions, worldwide trade in general commodity categories such as pharmaceuticals, electrical machinery, etc. For these purposes the outstanding presentation of international trade statistics since 1950 is the United Nations quarterly year-to-date cumulative publication, *Commodity Trade Statistics* (Statistical Papers, Series D); the import and export statistics of most of the major trading nations of the free world are presented by country of origin or destination in terms of the common commodity classification of 150 broad groupings, provided in the Standard International Trade Classification (2) (SITC) 3-digit group level.

The remaining discrepancies which are encountered by the general analyst in using the statistics presented in this publication are illustrated in Table 1. This table has been constructed by selecting a systematic sample of every 5th SITC group classification (starting at random with SITC group 021), locating the United States import statistics for these 30 items in the 1959 edition of the UN Series D publication. These figures are then compared with the matching statistics of exports of the same product reported in the export statistics for the countries whose figures are presented in this United Nations publication. Of the 30 SITC groups so selected, Table 1 omits 2 because of substantial incomparability, i.e., ordnance, 691, and returned goods and special transactions, 931.

It will be observed that wide discrepancies are relatively common even in the larger items of trade although for large items there is a tendency for discrepancies to be smaller. A separate tally, not reproduced here, showed that the discrepancies would be even greater in a similar table comparing U. S. export statistics for the selected SITC groups with the matching import statistics of the U. S. trading partners. (3) Although

not shown in the table, the percentage variations in the SITC group figures for each of the countries in Table 1 tend to be about evenly split between plus and minus variations. This split within each of the 10 countries also tends to hold for the three value groups and the various levels of percentage variation. (In a table comparing U. S. exports with the import figures of its trading partners this split between plus and minus variations in the SITC group figures would also be about the same, although the foreign country figures would tend to be higher since U. S. exports would be on an f.o.b. basis and the trading partner import figures on a c.i.f. basis.)

The existence of this split between plus and minus variations in the comparison of U. S. imports and exports with its trading partners brings into question the assumption that the overwhelming reason for discrepancies between trading partner figures on their commodity trade is the difference in country designation. If this were so, the figures on, say, U. S. imports of individual commodities from each of the trading partners would presumably tend to be either all plus or all minus when compared to the matching figures for the trading partner. It would appear that, while discrepancies frequently do occur because of differences in country designation, factors such as commodity classification differences contribute to the discrepancies to an important extent at least for cases in which the U. S. is one of the trading partners.

No analysis is made here of discrepancies from one time period to another, by estimated amount of ocean freight, by type of commodity, by broader commodity groupings, by type of country (transshipment point, etc.), by groupings of country, etc. Such analyses would undoubtedly reveal correlations with the magnitude of the discrepancies and probably a part of the variation could be attributed to or explained by actual practices; it appears likely that a great share of the discrepancies would still be unexplained particularly if the analysis attempted to cover the wider discrepancies which seemingly occur more frequently in the figures on trade with the smaller U. S. trading partners.

The general analyst is sometimes concerned with total trade figures without subdivision by commodity. As shown in Table 2, which is taken from the widely-used publication, *Direction of International Trade*, the discrepancies in such figures are much smaller than in Table 1. (The large discrepancies for Denmark in Table 2 may be attributed to the peculiar "purchase-sale" country designation used by that country.) This mainly results from the cancellation of the plus and minus variations which exist in the SITC group by country figures in Table 1; to the extent that the plus and minus variations in Table 1 result from commodity classification differences, these variations are of course eliminated in Table 2. An investigation has shown that the discrepancies in Table 2 for U. S. import figures would be greater for U. S. exports due in part to differing valuation definitions.

To avoid the difficulties illustrated by the comparisons in these tables most persons use these broad summary

Table 2

COMPARISON OF DOLLAR VALUE OF TOTAL UNITED STATES IMPORTS WITH MATCHING TRADING PARTNER FIGURES, 10 SELECTED COUNTRIES, 1959 (MILLIONS OF DOLLARS)

U. S. Trading Partner	U. S. Imports from Trading Partner	Trading Partner Exports to U. S.	Percent Variation [1]
Canada	$3,063	$3,362	10
U.K.	1,138	1,076	5
Belg.-Lux.	416	444	7
Denmark	104	142	37
France	462	470	2
Germ. Fed.	919	913	1
Neth.	217	209	4
Italy	388	345	11
Japan	1,029	1,051	2
Australia	198	192	3

[1] Calculated as in Table 1.
Source: Direction of International Trade, Statistical Paper Series T, Vol. XI, No. 9, joint publication of U.N., IMF, and IBRD.

groupings and either export or import figures. There is a tendency to put greater faith in import than in export figures. Users of the broader summary figures who are familiar with the reasons for the discrepancies, may thereby be inclined to tolerate them, particularly in broader groupings of commodities or countries where discrepancies tend to dampen out. Some analysts, seeing the discrepancies in individual cells, may tolerate them by attributing them to differences in specific factors such as valuation, coverage, country designation, etc. In doing this they may of course be mistaken and may interpret changes in comparability mix as changes in the pattern of trade. In any event the frequency of large discrepancies creates confusion and limits the usefulness of the analytical results obtained. Oskar Morganstern, for example concludes, after an analysis of discrepancies in trading partners' figures in gold and some discussion of the discrepancies in merchandise movements, "Writers on foreign trade will have to assume the burden of proof that the figures on commodity movements are good enough to warrant the manipulation and the reasoning to which they are customarily subject." (4)

A few observations might be made on the subject of investigating the reasons for discrepancies between the U. S. trade statistics and those of its trading partners and of deciding on a course of action to reduce these discrepancies (or the discrepancies among the export and import figures of the trading partners):

(1) It would appear desirable to carry out investigations of discrepancies between the statistics of the United States and its trading partners either in detailed commodity classifications or in summary groupings on a systematic basis rather than by piece-meal investigations as a particular question is raised. Such a systematic investigation could start with analyses of discrepancies between the trading partner figures in the UN Series D publication from period to period, by type of commodity, or country, by type of definition used in compiling the statistics, etc.,

followed by investigations of otherwise unexplained discrepancies on the basis of a sample of either individual international trade shipments or a sample of commodity by country cells.

(2) The investigations made by the United States, and when necessary jointly with its trading partners, of discrepancies involving United States trade statistics, have demonstrated that reasons for the discrepancies between trading partners statistics can be located. European and Latin American statistical organizations have also demonstrated that this can be accomplished. (5) The amount of work required for a sample of shipments or of commodity by country cells would apparently not be overwhelming although such investigation requires considerable elapsed time.

(3) The objective of the investigation of discrepancies (and planning what can effectively be done to reduce them) should give principal priority to rather broad commodity groupings, such as the 150 SITC groups in the United Nations Series D publication. This procedure provides a universe from which a sample of commodity by country cells or a stratified sample of shipments can be drawn; it also recognizes that there is probably a practical limitation on the degree of commodity detail in which increased comparability for the statistics of large numbers of trading countries can be achieved. (6)

(4) It is not clear to what extent the discrepancies between the statistics of the U. S. and of its trading partners cast doubt on the adequacy of the U. S. export and import statistics for use in comparisons with the U. S. domestic economy. To the extent that discrepancies are created by differences in country designation definitions, valuation and coverage definitions, etc., or compiling errors in the partner country statistics, there may be no indication of a loss of utility of U. S. trade statistics for "domestic" purposes. Discrepancies are in some part due to commodity misclassification or to other errors in the U. S. statistics and these may also affect the usefulness of the statistics for domestic purposes.

(5) Investigations which locate the causes of discrepancies between the U. S. and its trading partners' figures not only provide a basis for deciding the type of concerted action on coverage, valuation, and other definitions which might be agreed upon to reduce effectively discrepancies in general. The discovery of reasons for discrepancies in particular cells or for types of shipments may in itself be expected to result in cooperative remedial action by the countries involved. Such action may be expected in those cases where the discrepancy is found to arise from outright processing errors made in compiling the statistics of one or both countries in a pair. Straight processing errors may be an important cause of discrepancies; investigations to discover reasons for discrepancies are an effective method of preventing their recurrence, thereby improving statistical comparability and accuracy that in some countries, including the United States, is desirable for its own domestic purposes.

REFERENCES

(1) For a detailed discussion of reasons for discrepancies see R. G. D. Allen and J. E. Ely, *International Trade Statistics*, (New York, Wiley, 1953), pp 439. A briefer discussion appears in a statement by the Bureau of Foreign Commerce on pages 59-64 of "Hearings before the Subcommittee on Foreign Economic Policy of the Joint Committee on the Economic Report", 84th Congress, 1st session, 1955.

(2) First issued as United Nations, *Statistical Papers, Series M.* (No. 10, 15 September, 1950).

(3) It seems clear from certain unpublished exploratory work by John Rothrock of the Inter American Statistical Institute and William C. George of the U. S. Census Bureau that discrepancies are even greater among comparisons of trading partner SITC group figures for all countries shown in the UN Series D publication, i.e., comparisons of SITC group by country figures involving pairs of trading partners where the U.S. is not necessarily one of the partners.

(4) *The Validity of International Gold Movement Statistics* by Oskar Morgenstern, Special Papers in International Economics, International Finance Section, Department of Economics & Sociology, Princeton University, 1955, p. 40.

(5) See, for example, "Discrepancies in Trade Statistics—Memorandum by the National Institute of Statistics of Belgium and the Central Bureau of Statistics of the Netherlands" (Conf. Eur.Stats/93, 19 May 1958), submitted to the Conference of European Statisticians at the Sixth Plenary Session pursuant to discussions and agreements at previous sessions on the desirability of studies of discrepancies in trade statistics by pairs of countries. The Inter American Statistical Institute has also initiated investigations of this type based on recommendations contained in the Report of the I Session of the Committee on Improvement of National Statistics, Washington, D. C. June 2-8, 1951; IASI Doc. No. 1075ab Rev. Page 20).

(6) Further discussion of this point that comparability is apparently only feasible at the level of fairly broad commodity groupings is provided in the 1955 Hearings of the Joint Committee on the Economic Report (op.cit. footnote 1), statement of the Bureau of the Census, pages 71-74; this statement also describes what the United States has done over the years to aid in improving the comparability of its trade statistics with those of its trading partners.

THE PRESIDENT'S COLUMN—CONTINUED FROM PAGE 1

not available for the expansion of its program—and where ASA does not meet the needs of the professional workers, other groups or societies may try to fill the gap with less than satisfactory results. At the very least, ASA should stand ready to join with others to provide publications, meetings, special courses and other services needed in an expanding science. This readiness requires financial capability to carry our share.

II. *Items of Income*

The discussion following covers only the major budget items:

a. Dues and Subscriptions—Old and new members dues this year will total close to three-fifths of the total 1961 income. (The current membership is approximately 7,500 as compared to the 1950 total of 4,200.) JOURNAL subscriptions by non-members now number above 2,000 and this is not expected to be affected to any great extent by an increase in rates.

b. Advertising—This item in both the JOURNAL and THE AMERICAN STATISTICIAN would not be affected by a dues increase and is projected for about the the same magnitude in 1961 and 1962. It is not expected to show much increase, depending partly on recruitment advertising as well as general economic conditions. The National Office now conducts a continuing mail campaign among prospective advertisers and agencies, and effects of this solicitation may be felt later on.

c. Sales—JOURNAL sales of back copies are rather unpredictable—some years they show from two to three thousand dollars, others from four to over five thousand. This item is budgeted conservatively because of the uncertainty of demand. Sales of the Proceedings of the Business and Economic Statistics Section and the Social Statistics Section will probably continue to move slowly upward. As of now, the B&E Proceedings sales exceed direct expenses by a small amount. The more recently launched Social Statistics volume is just coming to the point where it will about break even. Expenses for producing these yearly editions will continue to climb in the future, but the selling price can probably be adjusted as necessary to recover costs.

d. Interest Income—Over the past decade, as the cumulative surplus grew, interest income rose each year. Now, due to withdrawals from savings institutions to meet bills, and to investments in mutual fund stocks, income from this item will dip somewhat. As receipts flow in heavily around the turn of the year, some funds are quickly placed in savings accounts to gain some interest income (for six months, at least). However, increasing interest income means leaving savings accounts undisturbed over long periods to get the maximum interest.

III. *Items of Expense*

a. Salaries—The increase in the salary budget since 1950 has been almost entirely due to higher wages paid to ASA's office staff, rather than to more workers hired. In terms of persons on the payroll now as compared to ten years ago, the number is almost the same (one half-time person more now). This has been accomplished partly by greatly increased efficiency, and partly by using temporary outside services to a greater extent (such as in the mailing process. We now have qualified help, and emphasis on service and quality has also enabled the office to improve efficiency without adding more employees. Thus, for some years, Parkinson's Law has not been operative. The Association should be proud of its small staff.

b. Publications—The largest share of the expense for 1961 is allocated to the cost of printing the JOURNAL. This has varied rather widely in some years, but over the last decade has evened out fairly well, with excesses over budget being balanced by those years when JOURNAL expense did not reach the amount set aside. This seems to provide the sort of editorial leeway so important to professional activity. There are three main reasons why increasing amounts each year are needed for this most important item:

1. More material is being submitted, meaning a larger amount of articles accepted (it has been ASA policy to avoid cramping the JOURNAL);
2. The cost of printing the JOURNAL constantly rises (a new printer's increase went into effect with the March 1961 issue);
3. More copies are being printed as more members and subscribers come in (also raising the postage and distribution costs.)

The Association has been fortunate for many years in receiving many editorial services on the JOURNAL either free of charge or at a very low rate. The Editors' universities have provided considerable subsidization in this way. We can only hope that this recognition of the Association's important professional role will continue.

THE AMERICAN STATISTICIAN has also experienced a sharp increase in its expenditures. The same reason as those given for the JOURNAL hold true here, though not to the same extent. However, some of the potential of this news-cum-expository article publication has yet to be realized. In its pages, THE AMERICAN STATISTICIAN can (and many urge should) carry news of interest to members of a number of allied societies, as well as articles dealing with the application of statistical methods. Changes in format and design can help this magazine become a widely read bulletin among other societies as well as ASA.

The Membership Directory expense will also increase as more copies are printed (to supply more members) and more detail is included in the listings. The Directory is scheduled for publication every three years.

The possibility of including in one volume the members of three societies (ASA, IMS and Biometrics, ENAR) has been considered. Each society could pay expenses based on the proportion of its membership. Another arrangement would be to have ASA publish as usual, including in the book those members of IMS and ENAR who were interested and who returned the completed form. These persons would be entitled to buy the Directory at a reduced rate. (ASA members get it free.) The

advantages of listing under one cover the greater part of those who are engaged in statistical work in this country are obvious. In time, this might become more than ever a truly central source of persons working with statistics.

c. Promotional Activity—If new members in large numbers are to join each year, promotional activity must be kept at a high level. This means mailing information about ASA to members of allied societies, and other groups, who may find membership in ASA of interest and value. Continued promotional activity has resulted in a substantial influx of new members. In addition to the fact that a certain percentage become continuing members (increasing the old member dues income as well), the work of ASA in its various aspects becomes more widely known and more useful. This is one of the main reasons for a professional society.

d. Rent—For the past ten years (and extending into 1962), the rent paid by the Association for its quarters has remained the same. We have been fortunate in paying so little for air-conditioned space. The amount of space is now quite inadequate for a society that has grown as large as ours. Following the expiration of the present lease, we will be faced with a double-barreled increase—the need for more space and the likelihood of paying more per square foot.

e. Operating Expenses—These items, such as supplies, postage, telephone, accounting services, etc., are subject to the general increase in the cost of all kinds of services and goods. The office continues to exercise strict economy on all such items, perhaps more than it should. Expenditures for new equipment are made where such purchases will mean a saving in manpower as well as improved service. Most of the office equipment was bought more than ten years ago and has since been written off via depreciation.

IV. *Recommendations and Summary*

In summary, a dues increase will probably be recommended by the Dues Committee to the Board, as mentioned above. This will be the first increase since 1948, and the necessity is obvious, considering the inflation in costs since that time. A dues increase will enable the Association to continue its growth and, at the same time, maintain a reserve that will be available as further demands are made in the form of more extensive services and increases in costs.

In reviewing the potential sources of income in the budget, there is an item which seems fruitful for a possible increase. This is Institutional Membership. Currently, there are forty organizations which hold Institutional Membership in ASA, at $100 per year. (In 1950, the figure was thirteen.) Considering the number of business firms and other types of organizations to whom statistics is of great importance, it would seem that this figure could be increased. However, it needs the cooperation and assistance of all members.

Increasing this type of membership means personal contact and solicitation. The only way to attain an effective increase is a vis-a-vis discussion with persons empowered to authorize or recommend the payment. The Committee is currently conducting a campaign through the Association's Chapters, with emphasis on the individual approach by the Chapter members. (The list of current Institutional Members appears on the inside front cover of each issue of the JOURNAL.)

Finally, it should be said that the Association has done well, particularly over the past decade, in improving its publications, meetings and office services. The growth has meant an increasing work and expense load, which now has reached the point where a dues increase is necessary to avoid deficit spending from reserves. This increase should pay the coming expenses, as well as provide flexibility for future growth.

(The complete audit figures for 1960 and the reports of the Board of Directors and the Secretary-Treasurer for the past year will be printed in the June 1961 issue of the JOURNAL. The audit figures show the 1960 budget by items and the actual increase or decrease for the past year.)

CONTRIBUTED PAPERS INVITED FOR 1961 ANNUAL MEETING

The 1961 Program Committee invites members to submit papers for the Contributed Papers Sessions at the Annual Meeting to be held in New York City, December 27-30, 1961. The Contributed Papers Sessions are intended to serve especially as a forum for the presentation of individual papers on new developments in statistics. These sessions serve the purpose of broadening the scope of papers at the Annual Meeting to cover new work falling outside the limited number of topics arranged by the Program Committee. It is also hoped that these Contributed Papers Sessions will encourage younger members of the Association to submit papers.

The deadline for submitting topics for Contributed Papers Sessions is June 1, 1961. The complete paper need not be submitted by that date, but it will be necessary to submit a summary or abstract indicative of the nature of the proposed paper. Some restrictions on the number of papers may be required in view of time and space limitations at the Meeting. Submissions may be made to one of the Section program representatives:

Biometrics Section	*Business and Economic Statistics Section*	*Section on Physical and Engineering Sciences*	*Social Statistics Section*	*Section on Training*
Arthur M. Dutton Box 287, Station 3 Rochester 20, N.Y.	Albert T. Sommers National Industrial Conference Board, Inc. 460 Park Ave. New York 22, N.Y.	Ray B. Murphy Bell Telephone Laboratories 463 West Street New York 14, N.Y.	Eli S. Marks National Analysts, Inc. 1015 Chestnut Street Philadelphia 7, Penn.	Samuel B. Richmond Graduate School of Business Columbia University New York, N.Y.

CHAPTER NOTES

New Chapters

On January 23, 1961, the Board of Directors approved charters for two new chapters—Atlanta, Georgia, and Madison, Wisconsin. See inside back cover for names and addresses of chapter President and Secretary.

Atlanta

The new Atlanta Chapter held a dinner meeting on February 7th on the subject of unemployment. Mrs. Maria Mallet, Georgia Department of Labor, spoke on "Current Trends and Statistical Techniques," and Holt E. Register, Georgia State Employment Service, discussed "Reasons for Unemployment and Future Outlook."

Donald C. Riley, Secretary-Treasurer and Executive Director of the American Statistical Association, is presenting its charter to the chapter on April 4th.

Central Indiana

The February 2nd meeting was held in Indianapolis at the Indiana University Medical Center Union Building. Dr. Charles E. Redman, Statistical Research Department, Eli Lilly and Co., spoke on "Serial Experimental Plans." The faithful who came on a bitter winter night got an insight into some of the problems associated with veterinary research.

The subject of the March 9th meeting, also held at the Medical Center Union Building in Indianapolis, was "A Computer Program for Population Projecting." Dr. John Liell, Department of Sociology, Indiana University, was the speaker.

The calendar for the remainder of the year is as follows:

May 4 (meeting changed to Purdue)—Stuart Hunter, Editor of TECHNOMETRICS, will be the speaker. Installation of the new officers.

Central New Jersey

Dr. John K. Hemphill, Educational Testing Service, was the speaker at the March 7th meeting. Dr. Hemphill's subject was "The Dimensions of School Administration." The talk included a description of techniques used to simulate parts of the elementary school principal's work, factor analytic procedures used to derive components of school administration, and relationships of performance criteria to psychological variables.

Chicago

A joint luncheon meeting with the Chicago Section of the American Society for Quality Control was held on January 24th. This was the first of what it is hoped will be a series of joint meetings of the two organizations. The subject of the meeting was "Cost Reduction through Statistics." Charles L. Matz and John Hughes, Distribution Engineering, Commonwealth Edison Co., showed how correlation analysis had been used to reduce greatly the errors made in estimating the supply and demand relationships from transformers. As a result of these more precise measurements the company had a reduction of $700,000 in investment during the first year of operation.

The February 7th luncheon was held jointly with the Chicago Chapter of the American Marketing Association. Professor George Katona, Director of the Survey Research Center, University of Michigan, spoke on "Consumer Expectations, their Function and their Measurement." Professor Katona told an overflow audience that, according to his surveys, the current lack of buying activity was not due to "consumer saturation" but was the result of a readjustment in the types of goods demanded and a fragmentation of the goals toward which consumers work.

February 14th was "New Members Night" for the Chicago Chapter. Sixty-five new members were welcomed. Chapter officers and committee chairmen were introduced, and each chairman summarized briefly the functions and goals of his committee and invited the new members to participate. The speaker of the evening was Stanley L. Payne, President of the Interview Research Institute, who talked on the subject, "Meeting Problems of Primary Data Collection." The meeting was held in the Illinois Bell dining room and was preceded by a Smorgasbord dinner.

The subject of the February 27th luncheon meeting was election polls. Dr. Peter Rossi, Director of the National Opinion Research Council, spoke on "An Analysis of 1960 Eelection Polls," and Ralph Otwell, Editor, City Desk, Chicago Sun Times, discussed "The Sun Times Straw Vote Poll —How We Did It."

Mrs. Elizabeth Slotkin, Chief of the Research and Statistics Section, Division of Unemployment Compensation, Illinois State Employment Service, was the speaker at the March 7th luncheon meeting. Mrs. Slotkin's subject was "New Techniques for Estimating Unemployment for Local Labor Market Areas."

Dayton

Dr. Gayle McElrath, Head of the Department of Industrial Engineering at the University of Minnesota, spoke to the Dayton (Ohio) Chapter at its last meeting, which was held January 23, 1961. His subject was "Design and Analysis."

The meeting was preceded by a dinner and informal discussion of opportunities for advanced university training in the field of statistics.

Harrisburg

A luncheon meeting was held on February 23rd at which Dr. Paul H. Wueller, Associate Director of the Joint State Government Commission, spoke on the work of that Commission, which serves as the research agency of the Pennsylvania General Assembly. Among the studies discussed by Dr. Wueller were occupational disease expenditures, truck damage to highways, the need for scholarships for deserving high school seniors, and operation of the state retirement system. He said that statistical methods used in each instance were the standard ones, but that the setting and approaches to the problem were different in each case.

Milwaukee

Dr. John Hogan, Staff Economist, Northwestern Mutual Life Insurance Co., and Lecturer in Economics, University of Wisconsin-Milwaukee, spoke at the February 15th meeting on "The Meaning of the President's Economic Report." Coffee and a discussion followed the talk. There was a very good response to the program.

New York

"Measurement and Evaluation of Comprehensive Medical Care" was the subject of the December 14th meeting of the Biostatistics Division. The speakers were George Silver, M.D., Chief of the Division of Social Medicine at Montefiore Hospital, and George Reader, M.D., Chief of the Department of Preventive Medicine at Cornell University School of Medicine. Josephine J. Williams, Research Associate at the Columbia University School of Public Health, was discussant. Dr. Silver described an eight-year experiment at Montefiore which was designed to determine whether an improvement in the health of families could be effected by the addition to comprehensive care programs of preventive and promotional health services in both the physical and emotional fields. Dr. Reader spoke on the methodology involved in the evaluation of a medical education program.

The January 25th meeting of the Social Statistics Section was devoted to a discussion of the 1960 Census of Population. Arthur F. Young, the New York Regional Census Supervisor, and Dudley Kirk, Demographic Director of the Population Council, were the speakers. Mr. Young described the methods of collection and tabulation in the 1960 census, dealing particularly with the techniques used in the New York enumeration and the problems encountered. Dr. Kirk discussed the early figures relating to growth and distribution of the population. He noted that the growth of 28 million in the U. S. population from 1950 to 1960 was the greatest absolute gain in the country's history. The growth attributable to natural increases was 17 percent, a rate higher than for any decade since 1870-1880. However, 51 percent of the 3103 counties in the country lost population. In some cases this was attributable to a flight to the suburbs, but in most it represents an exodus from rural counties and economically depressed areas.

Pittsburgh

On February 14, 1961, Dr. Edward B. Perrin, Assistant Professor of Biostatistics at the Graduate School of Public Health, University of Pittsburgh, spoke on "Estimation of Parameters in Systems that Are not Directly Observable." He showed how estimates of model parameters and a test of goodness of fit can be obtained in a situation where the variable of interest is related to observable phenomena only through an unknown monotone function.

On March 9, 1961, Dr. Michael Branson

of Carnegie Institute of Technology spoke on "The Method of Least Squares—Whose Idea Was It?" He began with a discussion of the interesting problems involved in going over two to three hundred year-old manuscripts—some written in Latin. The first man to work in a field related to least squares was Roger Cotes (1722); later (and better known) writers include Simpson (1756), Legendre (1805), Gauss (1809, etc.), Laplace (1812), Poisson (1827), and, in recent times Markov (1912).

The program for the remainder of the season includes:

April 11, Dr. S. M. Free (Smith, Kline and French Laboratories), "Some Statistical Applications in the Pharmaceutical Industry"

May 9, Professor F. J. Anscombe (Princeton University). Subject to be announced.

Sacramento

Last November, California's electorate voted for a $1.75 billion water bond issue. This money will be used to pay for the conservation of water and for its conveyance from Northern California to Southern California.

This was the subject of a speech delivered by Mr. Norman Sturm, Supervising Economist of the California State Department of Water Resources at the January 19, 1961 meeting. Mr. Sturm noted that California's population has been estimated at 55 million by the year 2020. In order to meet this pressure of growth, and its accompanying agricultural and industrial needs, approval of the water development project was essential.

Mr. Sturm is engaged in making economic studies of the several water districts which will be served by the project water diverted from Northern California. The purpose of these studies is to ascertain whether irrigation water users will be able to pay for this imported water once it is made available pursuant to the bond act.

Mr. Sturm made these observations: Generally, the higher the quantity of water required to grow a crop, the lower is the ability of that crop to pay for the water; the lack of a source of imported water, the lowering ground water table, and the existence of low quality water have increased the risks of farming to the extent that only large-sized farms can operate; once water can be delivered to an area in sufficient quantity and quality it is likely, judging from past experience, that large-sized farms will be broken up.

The economic studies of the several water districts include: (1) present and projected irrigation crop patterns; (2) derivation of double crops and acreages; and (3) computations of crop production costs and payment capacities for irrigation water by land class and by type of crop.

Saint Louis

At the February 23rd luncheon meeting, A. James Meigs, Federal Reserve Bank of St. Louis, discussed "Business Uses of Statistics." Mr. Meigs substituted for Edward A. Manookian, Board of Governors of the Federal Reserve System, Washington, D. C., who was unable to get to St. Louis because of the airlines strike.

The subject of the March 16th luncheon meeting was "Mathematics and Computers —Aids to Decision-Making?" The speaker was T. M. Bellan, Manager, Scientific Data Processing Dept., McDonnell Automation Center.

Future meetings are scheduled as follows:

April 20—ANNIVERSARY MEETING. Roy Wenzlick of Roy Wenzlick & Company—"Real Estate."

May 18—Virgil Seymour, Southern Illinois University—"Use of Cancer Detection Services in a Public Health Clinic."

June 22—Edward A. Manookian, Board of Governors of the Federal Reserve System—"Analytical Uses of the Revised Industrial Production Index."

San Francisco

A luncheon meeting was held on February 15th at which the speaker was Professor Virgil Salera, Chairman of the Department of Business Administration and Economics, Alameda State College. Professor Salera's subject was "Current Developments Affecting the Business Outlook."

Southern California

The speaker at the January 26th dinner meeting was Edward L. Pugh, Research Mathematician, Operations Research, Inc. Mr. Pugh's topic was "Theory of Probability and Its Application." This was the first in a series of a different type of program for the year 1961. These programs will be tailored to present a complete discussion on the various special techniques being used by statisticians. For the last few years the Chapter has tried through its programs to acquaint members with the use of statistics in all fields, but now feels this has been accomplished.

The subject of the February 23rd dinner meeting was "Progress in Non-Destructive Testing Here and Abroad." Dr. Kenneth A. Smith, Research Physicist and Consultant on Exotic Metals, was the speaker.

Washington, D.C.

The Washington Statistical Society held its Annual Dinner Meeting in February. A sold-out throng of 230 members and guests jammed the banquet hall. New Frontier luminaries James Tobin, member of the President's Council of Economic Advisors, Richard Scammon, newly-nominated Director of the Bureau of the Census, and Mortimer Caplin, new Director of the Internal Revenue Service, graced the podium.

Paul Krueger, president of the Society, introduced Chapter officials. He also announced the names of six graduate students in the universities of the area who were chosen as outstanding students in statistics and awarded complimentary memberships in the Association and the Society. National figures were introduced by Raymond Bowman, Assistant Director of the Office of Statistical Standards, who also presented the main speaker, A.S.A. President Martin Gainsbrugh.

Mr. Gainsbrugh's topic, "Economic Outlook and Data Needs for the '60's" turned out to be unusually timely and to the point of the current controversy over how serious is the current recession; how it compares with previous recessions in the '50's; what must begin to show up statistically, and when, to determine if it has hit bottom; and what are some of the gaps in data information that weaken interpretations and that should be closed in the coming years. Incidentally, he predicted a total population of about 220 million and labor force of about 87 million by 1970.

Irving Lorge, 1905-1961

Irving Lorge, Professor of Education and Executive Officer of the Institute of Psychological Research, Teachers College, Columbia University, died on January 23, 1961, of a heart attack. Professor Lorge received his B.S. degree from the College of the City of New York and his Ph.D. from Columbia University. During and after the war he was a consultant to the Secretary of War and other Federal agencies. In 1946 he received a citation from the War Department. He was a Fellow of the American Statistical Association, and was active in the New York Chapter. He was also a Fellow and Director of the American Association for the Advancement of Science, a Fellow and former President of the Psychometric Society, and a Fellow of the American Psychological Association. Professor Lorge was internationally known for his work on intelligence testing, readability tests, problems of retirement, and semantics.

Elliott H. Pennell, 1904-1961

Elliott Harmon Pennell, one of the nation's leading authorities on dental health statistics, died February 6 at George Washington University Hospital in Washington, D. C. after an illness of several months. He was 56. At the time of his death, Mr. Pennell was chief of the statistical staff of the Division of Dental Public Health and Resources, U. S. Public Health Service.

A specialist in the analysis of health manpower trends and service needs and utilization, Mr. Pennell joined the staff of the Public Health Service in 1931. He was the author of numerous articles and papers. He was a member of the American Statistical Association and a fellow and life member of the American Public Health Association.

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PERSONAL NEWS—CONTINUED FROM PAGE 8

from London Transport Executive to take charge of the new Statistical Advisory Service of The Economist Intelligence Unit Ltd., 22, Ryder Street, London, S.W.1.

LEE J. CRONBACH is spending the year 1960-61 as a Member of the Institute for Advanced Study, Princeton, N. J., while on leave from his position with the Bureau of Educational Research, University of Illinois.

PETER R. CULOS has been appointed Marketing and Marketing Research Account Manager of the Westminster Paper Co. Account. Westminster Paper is the Canadian Subsidiary of Scott Paper Co., Chester, Pennsylvania.

W. EDWARDS DEMING has been elected to honorary life membership in the German Statistical Society.

HORACE J. DePODWIN is now Manager, Public Affairs Research and Planning, General Electric Company, New York, and is also Lecturer, Graduate School of Business Administration, New York University.

A. ROSS ECKLER, Deputy Director of the Bureau of the Census, was given an Exceptional Service Award for "inspiring leadership in the Bureau of the Census development of data collection techniques."

PAUL ELDRIDGE, formerly Chief, Management Statistics Section, Bureau of Old-Age and Survivors Insurance, has joined the Office of Education as a Mathematical Statistician.

PAUL J. FITZPATRICK, for many years head of the Department of Economics, has retired from the Catholic University of America after 38 years of service. He is now teaching statistics part time at Villanova University and is continuing his research in the early history of American statistics.

PETER GAJEWSKI, formerly with the Office of Business Economics, Department of Commerce, has joined the Office of Special Studies, National Science Foundation, to assist the Program Director for Economic Studies.

WILLIAM A. GLENN has resigned from the faculty of Virginia Polytechnic Institute and has taken a position as a Statistician with the Research Triangle Institute, Durham, North Carolina.

FRANCIS J. GRAHAM, formerly Secretary of the Crop Reporting Board, Agricultural Marketing Service, has been named Agricultural Statistician In Charge for Minnesota.

ALLAN B. GURNEY has recently acquired a position as Market Research Analyst with the Hamilton Watch Co., in Lancaster, Pa. He was formerly associated with International Resistance Co., Philadelphia, Pa.

SOLOMON JOSEPHS, formerly with the Bureau of Old-Age and Survivors Insurance, has joined the Mathematical Statistics Staff, Statistics Division, Internal Revenue Service, as a Mathematical Statistician.

JAMES KARAVITE, formerly a Market Analyst for the Chrysler Corporation in Detroit, has been appointed a Market Analyst for The Electric Autolite Company in Toledo, Ohio.

WINTON C. KOCH has assumed new responsibilities as Marketing Manager of the Electronic Control Division, General Railway Signal Company, Rochester, New York, which engineers and markets ultrasonic devices and application systems for the precision detection and control of vehicles. He was formerly Marketing Manager of Buckeye Tools Corporation at Dayton, Ohio.

JAN W. KUZMA has completed the requirements for his M.S. in Biostatistics at Columbia University and has transferred to the University of Michigan for further postgraduate work in biostatistics.

DONALD LOVELAND, formerly with the National Cancer Institute, has joined the staff of the National Health Survey, National Center for Health Statistics, as an Analytical Statistician.

IWAO M. MORIYAMA has been appointed Chief of the Office of Health Trends Analysis, National Center for Health Statistics. He was formerly Chief of the Mortality Analysis Section of the National Office of Vital Statistics and will continue to serve as Acting Chief of the Section.

DONALD L. PARISE has been named Manager of the Media and Market Data Division of the Chicago Tribune's Research Department.

BENJAMIN PASAMANICK, Professor of Psychiatry at Ohio State University and Director of Research at the Columbus Psychiatric Institute, received the $500 Stratton Award of the American Psychopathological Association for 1961 for his studies on the epidemiology of mental disorder.

PAUL RACKOW has been promoted to the position of Statistical Sampling Specialist in the Planning Division of Port Development Department of the Port of New York Authority.

J. N. K. RAO, an advanced graduate student in Statistics at Iowa State University, has been selected as the recipient of the George W. Snedecor Award in Statistics, which consists of a cash prize of $25.00, a year's membership in the Institute of Mathematical Statistics and a year's subscription to the Annals of Mathematical Statistics.

A. C. ROSANDER, formerly with the Statistics Division of the Internal Revenue Service, has been appointed Chief of the Traffic Statistics Section, Interstate Commerce Commission.

JACK SCHARFF, Chief, Programming Branch, Economic Operations Division, Bureau of the Census, has been given a Meritorious Service Award.

GIFFORD H. SYMONDS was appointed Associate Professor of Management in the Department of Management at Case Institute of Technology in September 1960. He has been teaching graduate courses in Principles of Management and in Probability and Statistics and has been carrying on research with the Operations Research Group at Case.

HERBERT R. TACKER, formerly with the Anaconda American Brass Company, Waterbury, Connecticut, has been appointed Chief of the Management Statistics Section of the Statistics Branch, Division of Program Analysis, Bureau of Old-Age and Survivors Insurance.

JOHN R. TEDFORD, formerly with the Agricultural Economics Branch of TVA, joined the University of Missouri staff October 1, as Assistant Professor of Agricultural Economics. He will teach a course in elementary statistics and carry out research in the area of agricultural economics.

F. C. WATTS is now Principal Scientific Officer, Directorate of Civil and Transport Aircraft Research and Development, Ministry of Aviation, London, U.K.

ABBOT S. WEINSTEIN, formerly with the New York State Department of Mental Hygiene, has been appointed Director of the Biometrics Branch, Saint Elizabeths Hospital, Washington, D. C.

ARYNESS JOY WICKENS, Economic Adviser to the Secretary of Labor, received one of the awards made on February 24 to six outstanding women in the Federal career service. Mrs. Wickens received her award for "outstanding technical and administrative skill in initiating, organizing and directing wholly new and enormous statistical programs."

ROGER J. WILLIAMS, Jr., has joined Luria Bros. & Co., Inc., a major supplier of scrap metal to the steel industry and a division of the Ogden Corporation, as Business Research Manager. His duties will include long- and short-range forecasting of scrap industry trends. He was formerly an Economic Analyst with the Union Carbide Corporation. Mr. Williams is Chairman of the Business and Economics Division of the New York City Chapter of the American Statistical Association.

THEODORE D. WOOLSEY, formerly Assistant Director of the U. S. National Health Survey, is now Chief of the Survey. He is also Assistant Director of the National Center for Health Statistics.